



COASTAL ENVIRONMENTAL ANALYSTS

15 January 2008

Mr. Carl Goldstein
Pacific Insular Area Programs
CMD-1
Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Mr. Peter Peshut
American Samoa Environmental
Protection Agency
American Samoa Government
P.O. Box 368A
Pago Pago, American Samoa 96799

RE: Effluent Metals Testing – StarKist Samoa September 2007 Sampling

Enclosed are two copies of the report with the results of the effluent metals testing for StarKist Samoa, September 2007 sampling. The sampling and analysis were carried out without problems. The results are similar to the past effluent metals test results.

Please call us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel

Encl: Effluent Metals Testing – StarKist Samoa September 2007 Sampling

Cc: Brett Butler, StarKist Samoa; Joe Carney, StarKist Samoa; Tim Ruby, Del Monte; Rob Darby (with one copy of enclosure)

<p>P.O. BOX 1238 • 216 DRIFTWOOD LANE • TRINIDAD, CA • 95570 PHONE: 707-677-0123 • FAX: 707-677-9210 EMAIL: GLATZELDACOSTA@SUDDENLINK.NET</p>

TECHNICAL MEMORANDUM

gdc

EFFLUENT METALS TESTING – STARKIST SAMOA SEPTEMBER 2007 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa
Karen Glatzel
gdc, P.O. Box 1238, Trinidad, CA 95570
707-677-0123 – gdcocn@earthlink.net

Date: 21 December 2007

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

SUMMARY

The NPDES permit for StarKist Samoa includes effluent limitations for copper and zinc. The renewal permit will also include an effluent limitation for mercury. All three metals are discharged into an approved mixing zone. Semi-annual effluent monitoring for all three metals is currently required. The analysis for the 2007 tradewind season was done using eight (8) samples. A sample was collected every three hours for a 24 hr period September 4th and 5th, 2007. The results are summarized as follows:

	Flow (mg/d)	Hg (µg/l)	Cu (µg/l)	Zn (µg/l)
Minimum	1.17	0.0152	0.89	107
Average	1.26	0.0580	1.86	194
Maximum	1.39	0.1220	3.13	298
Water Quality Criterion		0.0500	3.10	81.0
Required Dilution		3.69	1.01	3.87

Copper was below the American Samoa Water Quality Standards criterion for all samples, except one, where it is equal to the standard. Mercury exceeded the ASWQS criterion for four of the eight samples, and zinc exceeded the criterion for all eight samples. Using background concentrations based on receiving water monitoring the dilutions required to meet the ASWQS criteria were two orders of magnitude lower than the predicted critical initial dilution. Therefore, compliance with the ASWQS is demonstrated well within the zone of initial dilution and the approved mixing zones.

INTRODUCTION

In September 2007 metals analyses were conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent. The samples were collected before the SKS effluent enters the Joint Cannery Outfall (JCO) shared with Chicken of the Sea Samoa Packing (COS). Both SKS and COS process tuna and, after high strength waste segregation, the treated process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water.

The existing SKS NPDES permit and renewal application has a permitted zone of mixing (ZOM) for both copper and zinc. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone. Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined effluent discharge. Each effluent grab sample was analyzed for mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Formerly, SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period, beginning in January 2006, the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

APPROACH AND METHODS

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 4 September and 06:00 on 5 September 2007, samples of final effluent were collected from the SKS effluent discharge at the established effluent sampling site.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. Samples were collected at approximately three-hour intervals over the 24-hour period. A total of eight grab samples were collected. A 1-gallon plastic cubitainer was filled at each sampling interval. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period.

After all samples were collected, laboratory supplied bottles (one for mercury analysis and one for copper and zinc analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

¹ Submitted to USEPA in July 2005.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports.

RESULTS AND DISCUSSION

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1. The laboratory data report is provided in Attachment 2.

Table 1. Results of Effluent Metals Testing – September 2007				
Time	Flow (mg/d)	Hg (µg/l)	Cu (µg/l)	Zn (µg/l)
4 Sept 2007 - 09:00	1.17	0.0614	2.90	290
4 Sept 2007 - 12:00	1.33	0.0168	3.13	298
4 Sept 2007 - 15:00	1.39	0.0152	1.91	227
4 Sept 2007 - 18:00	1.28	0.0490	0.89	107
4 Sept 2007 - 21:00	1.22	0.0630	1.94	232
5 Sept 2007 - 00:00	1.28	0.0502	0.94	130
5 Sept 2007 - 03:00	1.17	0.0866	1.54	135
5 Sept 2007 - 06:00	1.27	0.1220	1.63	132
Minimum	1.17	0.0152	0.89	107
Average	1.26	0.0580	1.86	194
Maximum	1.39	0.1220	3.13	298
Standard Deviation	0.076	0.0351	0.81	77.0

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS September 2007 samples (0.0580 µg/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 µg/l) and less than to the averages of supplemental mercury testing conducted in previous analyses summarized in the next section.
- There was noticeable, but relatively low, variability among the results from individual grab samples (standard deviation = 0.035 µg/l) as shown in Table 1.
- Four of the eight of the samples were above the recently revised ASWQS water quality standard criteria of 0.05 µg/l. One sample was equal to the criterion. The current NPDES Permit does not have a limitation for mercury.
- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS September 2007 samples was 1.86 µg/l (Table 1). The average concentrations reported for this sampling period are generally less than those reported for previous analyses as described in the next section, and similar to the value reported in February 2007.
- There was noticeable, but relatively low, variability among the copper results from the eight individual grab samples with a standard deviation of 0.81 µg/l.

³ Conducted in September 2004.

- All of the samples had copper concentrations below or equal to the ASWQS criterion⁴ of 3.1 µg/l (one sample was essentially the same as the criterion). The values are well below the current NPDES Permit limitation for copper (monthly average of 66 µg/l, and daily maximum of 108 µg/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

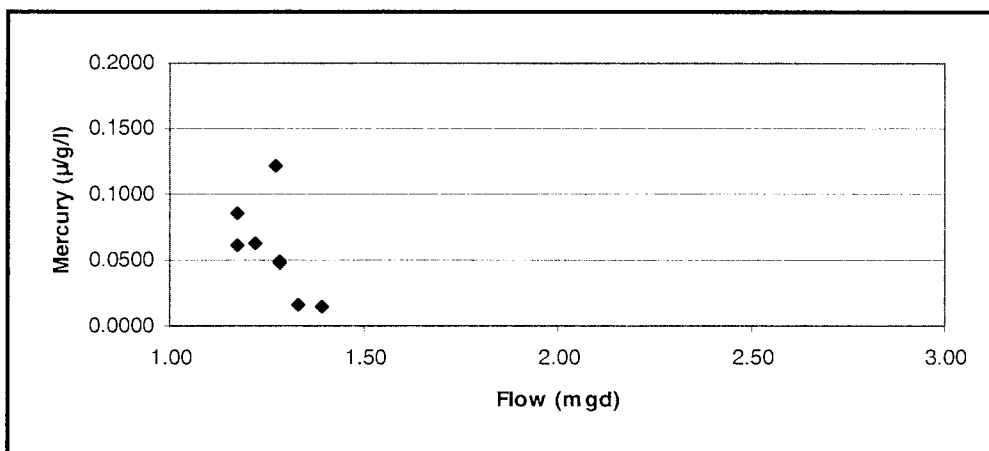


Figure 1. SKS effluent flow rate and mercury concentration (Sept 2007)

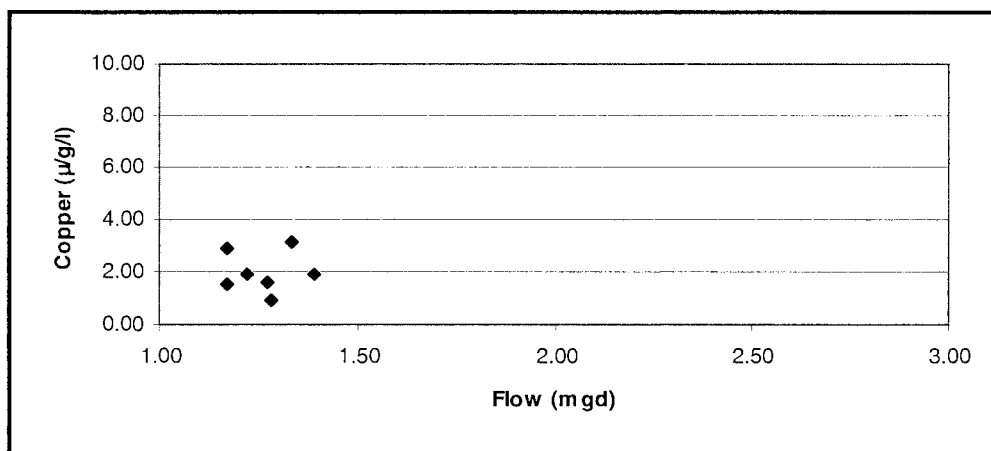


Figure 2. SKS effluent flow rate and copper concentration (Sept 2007)

The results of the sample testing for zinc indicate:

- The average zinc concentration for the SKS September 2007 samples was 194 µg/l (Table 1). This concentration is less than the average values for previous analyses described in the next section and about the same as the result for the February 2007 sampling.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 77.0) with a range between 107 µg/l and 298 µg/l (Table1).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 µg/l. All values are well below the current NPDES Permit limitation (1545 µg/l monthly average and 1770 µg/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

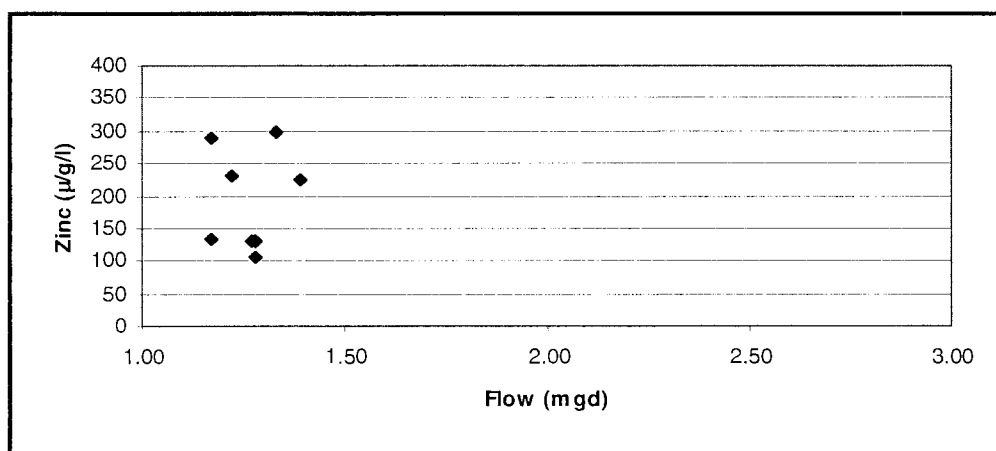


Figure 3. SKS effluent flow rate and zinc concentration (Sept 2007)

Comparison to Previous Tests

A summary of the semi-annual metals testing is presented in Table 2. Each of the metals under consideration has been measured in the effluent above the ASWQS criteria. Table 2 also provides the results of calculations necessary to show that ASWQS will be achieved within the zone of initial dilution (ZID). The required dilution is calculated using the following equation:

$$D_R = \frac{C_E - C_A}{C_S - C_A}$$

where

D_R = is the dilution required to reduce the concentration to the ASWQS

C_E = the effluent concentration

C_A = the maximum receiving water concentration

C_S = The ASWQS criterion

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

Table 2. Summary of Effluent Metals Testing Results and Dilution Required* to Meet ASWQS Criteria								
Parameter		Mercury		Copper		Zinc		
Water Quality Criterion		0.05 µg/l		3.1 µg/l		81 µg/l		
Ambient Maximum		0.0232 µg/l		0.83 µg/l		5.5 µg/l		
Sample Date	Flow (mgd)	Conc. (µg/l)	Dilution Required	Conc. (µg/l)	Dilution Required	Conc. (µg/l)	Dilution Required	
Aug 2005	2.44	0.0734	1.87					
	3.05	0.109	3.20					
	3.02	0.101	2.90					
	2.39	0.122	3.69					
	2.55	0.177	5.74					
	2.8	0.153	4.84					
	2.03	0.112	3.31					
	2.14	0.0912	2.54					
	1.98	0.107	3.13	3.63	1.23	264	3.42	
	2.63	0.083	2.23	2.82	1	196	2.52	
	2.6	0.298	10.25	2.17	1	146	1.86	
	1.94	0.088	2.42	3.61	1.22	226	2.92	
	1.95	0.096	2.72	3.67	1.25	340	4.43	
	2.16	0.092	2.57	2.44	1	267	3.46	
Feb 2006	2.53	0.102	2.94	1.79	1	190	2.44	
	2.15	0.145	4.54	4.83	1.76	266	3.45	
	2.03	0.0802	2.13	2.92	1	200	2.58	
	2.12	0.0820	2.19	3.93	1.37	272	3.53	
	2.22	0.150	4.73	4.32	1.54	368	4.80	
	2.76	0.140	4.36	3.3	1.09	322	4.19	
	2.59	0.106	3.09	3.14	1.02	329	4.28	
Nov 2006	2.40	0.104	3.01	2.79	1	246	3.19	
	2.41	0.158	5.03	3.35	1.11	278	3.61	
	2.60	0.115	3.43	2.28	1	195	2.51	
	2.20	0.0550	1.19	1.56	1	169	2.17	
	2.02	0.0586	1.32	2.31	1	296	3.85	
	2.06	0.0676	1.66	2.02	1	178	2.28	
	2.50	0.0501	1.00	1.43	1	142	1.81	
Feb 2007	2.48	0.0704	1.76	2.16	1	196	2.52	
	1.76	0.0427	1	1.81	1	166	2.13	
	2.16	0.0825	2.21	2.98	1	222	2.87	
	2.15	0.0810	2.16	2.13	1	159	2.03	
	1.17	0.0614	1.43	2.90	1	290	3.77	
	1.33	0.0168	1	3.13	1.01	298	3.87	
	1.39	0.0152	1	1.91	1	227	2.93	
Sep 2007	1.28	0.0490	1	0.89	1	107	1.34	
	1.22	0.0630	1.49	1.94	1	232	3.00	
	1.28	0.0502	1.01	0.94	1	130	1.65	
	1.17	0.0866	2.37	1.54	1	135	1.72	
	1.27	0.1220	3.69	1.63	1	132	1.68	
	Minimum	1.17	0.0152	1.00	0.89	1.00	107	1.34
	Average	2.12	0.0964	2.80	2.57	1.08	225	2.90
Maximum	3.05	0.2980	10.25	4.83	1.76	368	4.80	

*If the effluent concentration is equal to or less than the criterion, the dilution required is shown as 1.

*If the effluent concentration is equal to or less than the criterion, the dilution required is shown as 1.

Conclusions

Based on the available data a mixing zone will be required for each of the three metals considered. The required dilution (See Table 2) for all of the metals is substantially less than the critical initial dilution, which is over 300:1⁶. Therefore, compliance with the ASWQS criteria will be achieved well within the ZID. The highest dilution required was 10.3:1, which will be achieved within 2.7 meters of the discharge point, within three seconds after discharge, and about one meter above the discharge point (in a total water depth of about 53.6 meters).

⁶ See "Request for Water Quality Certification and the Definition of Mixing Zones". **gdc**, 28 June 2007

ATTACHMENT I

Chain-of-Custody

CHAIN OF CUSTODY

10708430

0000

PROJECT:	StarKist Effluent Monitoring - SKS0702.TW													
FROM:	Karen Glatzel, gdc													
	P.O. Box 1238, Trinidad, CA, 95570-1238						707-677-0123			gdcoch@earthlink.net				
TO:	Harvey Jacky, Columbia Analytical Services													
	1317 South 13th Ave, Kelso, WA 98626						360-577-7222							
SAMPLE I.D.	DATE	TIME	MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUESTED								COMMENTS	
					Total-P	NH3-N	NO3+NO2	TKN (AmTest)	Chlorophyll-a	Cu	Zn	Hg		
SKS-1	9/5/2007		Water	2							X	X	X	Total metals
SKS-2	9/5/2007		Water	2							X	X	X	
SKS-3	9/5/2007		Water	2							X	X	X	
SKS-4	9/5/2007		Water	2							X	X	X	
SKS-5	9/5/2007		Water	2							X	X	X	
SKS-6	9/5/2007		Water	2							X	X	X	
SKS-7	9/5/2007		Water	2							X	X	X	
SKS-8	9/5/2007		Water	2							X	X	X	
SAMPLED BY: K. Glatzel					DATE/TIME:	9/5/2007	SPECIAL INSTRUCTIONS/REMARKS: Note: Sample may be as much as 40% seawater Report Dup, MS, MSD as required							
SHIPPED VIA: DHL					DATE/TIME:	9/6/2007								
RELINQUISHED BY: S.Costa					DATE/TIME:	9/6/2007								
RECEIVED BY: Harvey Jacky					DATE/TIME:	9/8/07 1630								
RELINQUISHED BY:					DATE/TIME:									
RECEIVED BY:					DATE/TIME:									



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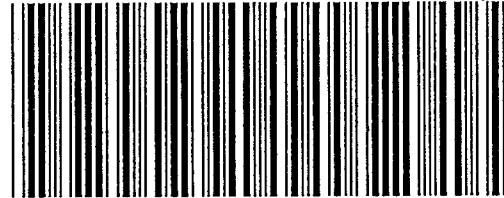
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Shipper's Reference (up to 35 characters) NPDES - RWI - GDC (07-TW)
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KELSO, WA
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ATTACHMENT II

Columbia Analytical Systems Laboratory Report

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Glatzel da Costa, gdc	Service Request No.:	K0708430
Project:	Starkist Effluent Monitoring / SKS0702.TW	Sample Matrix:	Water
Date Received:	09/18/07		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).


Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 09/18/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples for the reductive precipitation procedure. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

Approved by _____  Date 10/31/07

0006

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-1 Lab Code: K0708430-001

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	2.90		
Zinc	200.8	21.4	1.71	20.0	10/02/07	10/04/07	290		

% Solids: 0.0

Comments:

0013

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-2 Lab Code: K0708430-002

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	3.13		
Zinc	200.8	21.7	1.74	20.0	10/02/07	10/04/07	298		

% Solids: 0.0

Comments:

0014

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-3 Lab Code: K0708430-003

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	1.91		
Zinc	200.8	21.5	1.72	20.0	10/02/07	10/04/07	227		

% Solids: 0.0

Comments:

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-4 Lab Code: K0708430-004

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	0.89		
Zinc	200.8	1.06	0.09	1.0	10/02/07	10/04/07	107		

% Solids: 0.0

Comments:

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-5 Lab Code: K0708430-005

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	1.94		
Zinc	200.8	21.4	1.71	20.0	10/02/07	10/04/07	232		

% Solids: 0.0

Comments:

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Sample Name: SKS-6 Lab Code: K0708430-006

% Solids: 0.0

Comments:

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-7 Lab Code: K0708430-007

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.06	1.0	10/02/07	10/04/07	1.54		
Zinc	200.8	1.07	0.09	1.0	10/02/07	10/04/07	135		

% Solids: 0.0

Comments:

0019

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc **Service Request:** K0708430
Project No.: SKS0702.TW **Date Collected:** 9/5/07
Project Name: Starkist Effluent Monitoring **Date Received:** 9/18/07
Matrix: WATER **Units:** ug/L
Basis: N/A

Sample Name: SKS-8 **Lab Code:** K0708430-008

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	1.63		
Zinc	200.8	1.07	0.09	1.0	10/02/07	10/04/07	132		

% Solids: 0.0

Comments:

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected:
Project Name: Starkist Effluent Monitoring Date Received:
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: Method Blank Lab Code: K0708430-MB

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.10	0.03	1.0	10/02/07	10/04/07	0.03	U	
Zinc	200.8	0.50	0.04	1.0	10/02/07	10/04/07	0.04	U	

% Solids: 0.0

Comments:

Columbia Analytical Services

Metals

- 3 -

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Method
		C	1	C	2	C	3	C	
Copper	0.30	U	0.30	U	0.30	U	0.30	U	200.8
Zinc	0.4	U	0.4	U	0.4	U	0.4	U	200.8

Columbia Analytical Services

Metals

- 3 -

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Method
			1	C	2	C	3	C	
Copper			0.30	U	0.30	U	0.30	U	200.8
Zinc			0.4	U	0.4	U	0.4	U	200.8

0028

Columbia Analytical Services

Metals

- 3 -

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Method
			1	C	2	C	3	C	
Copper			0.39	B	0.30	U			200.8
Zinc			1.1	B	0.4	U			200.8

Columbia Analytical Services

Metals

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DUPLICATES

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Units: UG/L

Project Name: Starkist Effluent Monitoring

Basis: N/A

Matrix: WATER

% Solids: 0.0

Sample Name: DLCSW K0708475

Lab Code: LCSWD

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Copper		1.98		1.97		0.5		200.8
Zinc		2.10		2.36		11.7		200.8

Columbia Analytical Services

Metals

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DETECTION LIMITS

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Project Name: Starkist Effluent Monitoring

ICP/ICP-MS ID #: K-ICP-MS-03

GFAA ID #:

AA ID #:

Analyte	Isotope	Back-ground	MRL ug/L	MDL ug/L	M
Copper	65		1.00	0.3	MS
Zinc	66		5.0	0.4	MS

Comments:

0033

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
Sample Matrix: Water

Service Request: K0708430
Date Collected: 09/05/07
Date Received: 09/18/07

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0708430-001	5.0	0.25	5	09/18/07	09/26/07	61.4	
SKS-2	K0708430-002	1.0	0.05	1	09/18/07	09/26/07	16.8	
SKS-3	K0708430-003	1.0	0.05	1	09/18/07	09/26/07	15.2	
SKS-4	K0708430-004	1.0	0.05	1	09/18/07	09/26/07	49.0	
SKS-5	K0708430-005	1.0	0.05	1	09/18/07	09/26/07	63.0	
SKS-6	K0708430-006	1.0	0.05	1	09/18/07	09/26/07	50.2	
SKS-7	K0708430-007	1.0	0.05	1	09/18/07	09/26/07	86.6	
SKS-8	K0708430-008	1.0	0.05	1	09/18/07	09/26/07	122	
Method Blank 1	K0708430-MB1	1.0	0.05	1	09/17/07	09/26/07	0.3	B
Method Blank 2	K0708430-MB2	1.0	0.05	1	09/17/07	09/26/07	ND	
Method Blank 3	K0708430-MB3	1.0	0.05	1	09/17/07	09/26/07	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
Sample Matrix: Water

Service Request: K0708430
Date Collected: 09/05/07
Date Received: 09/18/07
Date Extracted: 09/18/07
Date Analyzed: 09/26/07

**Matrix Spike/Duplicate Matrix Spike Summary
Total Metals**

Sample Name: SKS-4
Lab Code: K0708430-004S, K0708430-004SD
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level		Sample Result	Spike Result		Percent Recovery		CAS Acceptance Limits	Relative Percent Difference	Result Notes
				MS	DMS		MS	DMS	MS	DMS			
Mercury	METHOD	1631E	1.0	25	25	49.0	67.7	71.2	75	89	71-125	5	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
LCS Matrix: Water

Service Request: K0708430
Date Collected: NA
Date Received: NA
Date Extracted: 09/18/07
Date Analyzed: 09/26/07

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial) **Units:** ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.60	92	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
LCS Matrix: Water

Service Request: K0708430
Date Collected: NA
Date Received: NA
Date Extracted: 09/18/07
Date Analyzed: 09/26/07

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.46	89	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
LCS Matrix: Water

Service Request: K0708430
Date Collected: NA
Date Received: NA
Date Extracted: 09/18/07
Date Analyzed: 09/26/07

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery	Result Notes
						Acceptance Limits	
Mercury	METHOD	1631E	5.00	4.34	87	77-123	



COASTAL ENVIRONMENTAL ANALYSTS

28 July 2007

Mr. Carl Goldstein
Pacific Insular Area Programs
CMD-1
Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Mr. Peter Peshut
American Samoa Environmental
Protection Agency
American Samoa Government
P.O. Box 368A
Pago Pago, American Samoa 96799

RE: Effluent Metals Testing – StarKist Samoa February 2007 Sampling

Enclosed is one report concerning the effluent metals testing for StarKist Samoa, February 2007 sampling. The sampling and analysis were carried out without problems. The results are similar to the past effluent metals test results.

Please call us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel

Cc: Brett Butler, StarKist Samoa; Joe Carney, StarKist Samoa; Tim Ruby, Del Monte;
Rob Darby, CH2M HILL

Encl: Effluent Metals Testing – StarKist Samoa Feb 2007 Sampling

<p>P.O. BOX 1238 • 216 DRIFTWOOD LANE • TRINIDAD, CA • 95570 PHONE: 707-677-0123 • FAX: 707-677-9210 EMAIL: GLATZELDACOSTA@SUDDENLINK.NET</p>

TECHNICAL MEMORANDUM

gdc

EFFLUENT METALS TESTING – STARKIST SAMOA FEBRUARY 2007 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa
Karen Glatzel
gdc, P.O. Box 1238, Trinidad, CA 95570
707-677-0123 – gdcocn@earthlink.net

Date: 27 July 2007

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

SUMMARY

The NPDES permit for StarKist Samoa includes effluent limitations for copper and zinc. The renewal permit will also include an effluent limitation for mercury. All three metals are discharged into an approved mixing zone. Semi-annual effluent monitoring for all three metals is currently required. The analysis for the 2007 non-tradewind season was done using eight (8) samples collected every three hours on February 27th and 28th, 2007. The results are summarized as follows:

	Flow (mg/d)	Hg (µg/l)	Cu (µg/l)	Zn (µg/l)
Minimum	1.76	0.0427	1.43	142
Average	2.17	0.0635	2.05	191
Maximum	2.50	0.0825	2.98	296
Water Quality Criterion		0.0500	3.10	81.0
Required Dilution		2.2	--	3.9

Copper was below the American Samoa Water Quality Standards criterion for all samples. Mercury exceeded the ASWQS criterion for 7 of the eight samples and zinc exceeded the criterion for all eight samples. Using background concentrations based on receiving water monitoring the dilutions required to meet the ASWQS criteria were two orders of magnitude lower than the predicted critical initial dilution. Therefore, compliance with the ASWQS is demonstrated well within the zone of initial dilution and the approved mixing zones.

INTRODUCTION

In February 2007 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent. The samples were collected before the SKS effluent enters the Joint Cannery Outfall (JCO) shared with Chicken of the Sea Samoa Packing (COS). Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water.

The existing SKS NPDES permit and renewal application has a permitted ZOM for both copper and zinc. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone. Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period, beginning in January 2006, the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

APPROACH AND METHODS

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 27 February and 06:00 on 28 February 2007, samples of final effluent were collected from the SKS effluent discharge at the established effluent sampling site.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period.

After all samples were collected, laboratory supplied bottles (one for mercury analysis and one for copper and zinc analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

¹ Submitted to USEPA in July 2005.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports.

RESULTS AND DISCUSSION

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1. The laboratory data report is provided in Attachment 2.

Table 1. Results of Effluent Metals Testing				
Time	Flow (mg/d)	Hg (µg/l)	Cu (µg/l)	Zn (µg/l)
27 Feb 2007 - 09:00	2.20	0.0550	1.56	169
27 Feb 2007 - 12:00	2.02	0.0586	2.31	296
27 Feb 2007 - 15:00	2.06	0.0676	2.02	178
27 Feb 2007 - 18:00	2.50	0.0501	1.43	142
27 Feb 2007 - 21:00	2.48	0.0704	2.16	196
28 Feb 2007 - 00:00	1.76	0.0427	1.81	166
28 Feb 2007 - 03:00	2.16	0.0825	2.98	222
28 Feb 2007 - 06:00	2.15	0.0810	2.13	159
Minimum	1.76	0.0427	1.43	142
Average	2.17	0.0635	2.05	191
Maximum	2.50	0.0825	2.98	296
Standard Deviation	0.242	0.0143	0.48	48.9

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS February 2007 samples (0.0635 µg/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 µg/l) and less than to the averages of supplemental mercury testing conducted in previous analyses summarized in the next section.
- There was little variability among the results from individual grab samples (standard deviation = 0.014 µg/l) as shown in Table 1.
- Seven of the eight of the samples were above the recently revised ASWQS water quality standard criteria of 0.05 µg/l. The current NPDES Permit does not have a limitation for mercury.
- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS February 2007 samples was 2.05 µg/l (Table 1). The average concentrations reported for this sampling period are less than those reported for previous analyses as described in the next section.
- There was little variability among the copper results from the eight individual grab samples with a standard deviation of 0.48 µg/l.

³ Conducted in September 2004.

- All of the samples had copper concentrations below the ASWQS criterion⁴ of 3.1 µg/l. The values are well below the current NPDES Permit limitation for copper (monthly average of 66 µg/l, and daily maximum of 108 µg/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

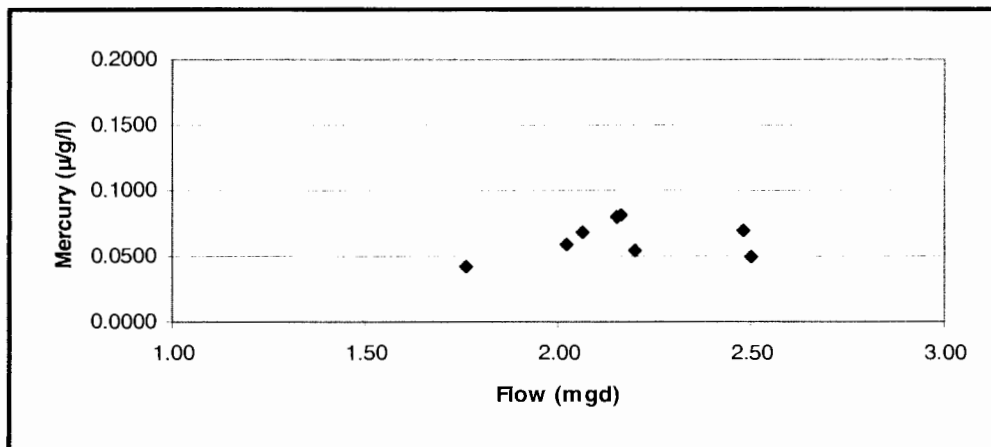


Figure 1. SKS effluent flow rate and mercury concentration (Feb 2007)

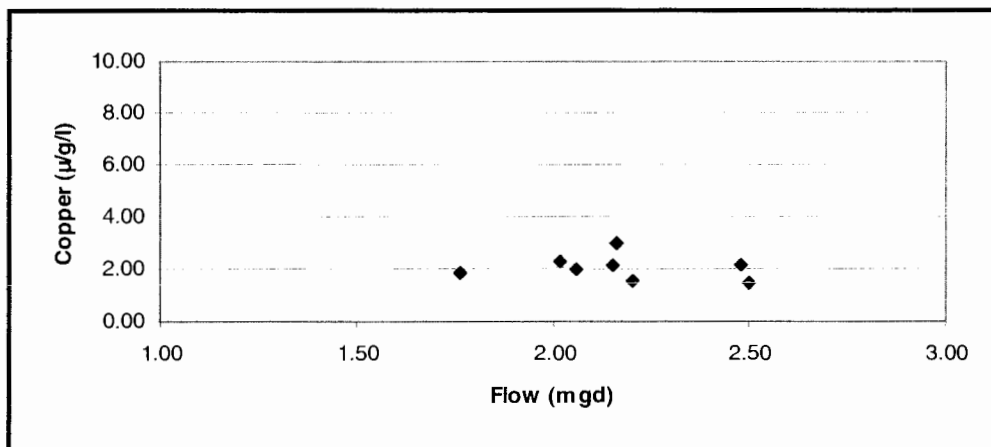


Figure 2. SKS effluent flow rate and copper concentration (Feb 2007)

The results of the sample testing for zinc indicate:

- The average zinc concentration for the SKS February 2007 samples was 191 µg/l (Table 1). This concentration is less than the average values for previous analyses described in the next section.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 48.9) with a range between 142 µg/l and 296 µg/l (Table1).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 µg/l. All values are well below the current NPDES Permit limitation (1545 µg/l monthly average and 1770 µg/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

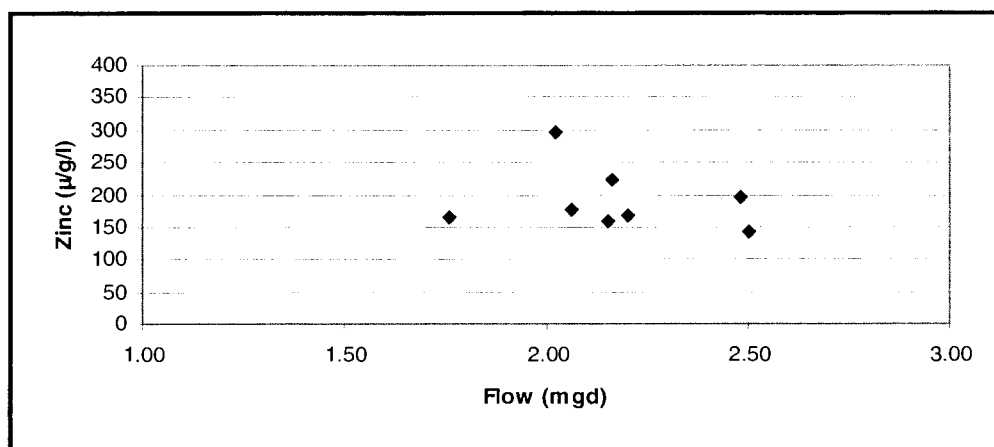


Figure 3. SKS effluent flow rate and zinc concentration (Feb 2007)

Comparison to Previous Tests

A summary of the semi annual metals testing is presented in Table 2. Each of the metals under consideration has been measured in the effluent above the ASWQS criteria. Table 2 also provides the results of calculations necessary to show that ASWQS will be achieved within the zone of initial dilution. The required dilution is calculated using the following equation:

$$D_R = \frac{C_E - C_A}{C_S - C_A}$$

where

D_R = is the dilution required to reduce the concentration to the ASWQS

C_E = the effluent concentration

C_A = the maximum receiving water concentration

C_S = The ASWQS criterion

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

Table 2. Summary of Effluent Metals Testing Results and Dilution Required to Meet ASWQS Criteria							
Parameter		Mercury		Copper		Zinc	
Water Quality Criterion		0.05 µg/l		3.1 µg/l		81 µg/l	
Ambient Maximum		0.0232 µg/l		0.83 µg/l		0.55 µg/l	
Sample Date	Flow (mgd)	Conc. (µg/l)	Dilution Required	Conc. (µg/l)	Dilution Required	Conc. (µg/l)	Dilution Required
Aug 2005	2.44	0.0734	1.87				
	3.05	0.109	3.20				
	3.02	0.101	2.90				
	2.39	0.122	3.69				
	2.55	0.177	5.74				
	2.8	0.153	4.84				
	2.03	0.112	3.31				
	2.14	0.0912	2.54				
Feb 2006	1.98	0.107	3.13	3.63	1.23	264	3.27
	2.63	0.083	2.23	2.82		196	2.43
	2.6	0.298	10.25	2.17		146	1.81
	1.94	0.088	2.42	3.61	1.22	226	2.80
	1.95	0.096	2.72	3.67	1.25	340	4.22
	2.16	0.092	2.57	2.44		267	3.31
	2.53	0.102	2.94	1.79		190	2.35
	2.15	0.145	4.54	4.83	1.76	266	3.30
Nov 2006	2.03	0.0802	2.13	2.92		200	2.48
	2.12	0.0820	2.19	3.93	1.37	272	3.37
	2.22	0.150	4.73	4.32	1.54	368	4.57
	2.76	0.140	4.36	3.3	1.09	322	4.00
	2.59	0.106	3.09	3.14	1.02	329	4.08
	2.40	0.104	3.01	2.79		246	3.05
	2.41	0.158	5.03	3.35	1.11	278	3.45
	2.60	0.115	3.43	2.28		195	2.42
Feb 2007	2.20	0.0550	1.19	1.56		169	2.09
	2.02	0.0586	1.32	2.31		296	3.67
	2.06	0.0676	1.66	2.02		178	2.21
	2.50	0.0501	1.00	1.43		142	1.76
	2.48	0.0704	1.76	2.16		196	2.43
	1.76	0.0427		1.81		166	2.06
	2.16	0.0825	2.21	2.98		222	2.75
	2.15	0.0810	2.16	2.13		159	1.97
Minimum	1.76	0.04	1.00	1.43	1.02	142.00	1.76
Average	2.34	0.11	3.17	2.81	1.29	234.71	2.91
Maximum	3.05	0.30	10.25	4.83	1.76	368.00	4.57

Conclusions

Based on the available data a mixing zone will be required for each of the three metals considered. The required dilution (See Table 2) for all of the metals is substantially less than the critical initial dilution, which is over 300:1⁶. Therefore, compliance with the ASWQS criteria will be achieved well within the ZID. The highest dilution required was 10.3:1, which will be achieved within 2.7 meters of the discharge point, within three seconds after discharge, and about one meter above the discharge point (in a total water depth of about 53.6 meters).

⁶ See "Request for Water Quality Certification and the Definition of Mixing Zones". **gdc**, 28 June 2007

ATTACHMENT I

Chain-of-Custody



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1 Payer account number and shipment value protection details

Charge to ☒ Shipper ☐ Receiver ☐ 3rd Party

Payer Account No. 918902 636

Shipment Value Protection (see reverse)

☐ Yes Declared Value for Carriage (in US \$) _____

Not all payment options are available in all countries.

☐ Cash
☐ Check
☐ Credit Card

2 From (Shipper)

Shipper's Account Number 918902 636 Contact Name JOE CARNEY

Shipper's Reference (up to 35 characters) NPDES-RW-GDC

Company Name STAR KIST SAMOA

Address P.O. Box AMERICAN SAMOA

Post/ZIP Code (required) 96799 Phone, Fax, or E-mail (required) 6846444231

3 To (Receiver)

Company Name COLUMBIA ANALYTICAL SERVICES

Contact Person HARVEY JACKY

Delivery Address DHL Cannot Deliver to a PO Box 1317 SOUTH 13TH AVE KENESA WA

Country USA

Post/ZIP Code (required) 98626 Phone, Fax, or E-mail (required) 360-577-7222

4 Shipment Details

Total number of packages 6

Total Weight 313 lbs

Dimensions (in inches)

Pieces	Length	Width	Height
@	x	x	x
@	x	x	x
@	x	x	x

5 Full Description of Contents

Give Content and Quantity

WATER QUALITY SAMPLES FOR LABORATORY ANALYSIS

NO COMMERCIAL VALUE

6 Dutiable Shipments Only (Customs requirement)

Attach the original and four copies of a Proforma or Commercial Invoice.

Export License No./Symbol (if applicable) _____ Receiver's VAT/GST or Shipper's EIN/SSN _____

Declared Value for Customs (in US \$) (as on commercial/proforma invoice) 360

Schedule B Number / Harmonized Code (if applicable) _____

AES TRANSACTION NUMBER _____

TYPE OF EXPORT ☐ Permanent ☐ Repair/Return ☐ Temporary

Destination Duties/Taxes If left blank, Receiver pays duties/taxes.

☐ Receiver ☒ Shipper ☐ Other _____

The commodities, technology or software to be exported from the U.S. are in compliance with the U.S. Bureau of Export Administration. Diversion to countries contrary to U.S. law prohibited.

7 Shipper's Authorization (signature required)

I/we agree that DHL's standard terms apply to this shipment and limit DHL's liability for loss or damage to U.S. \$100. The Warsaw Convention may also apply (see reverse). I/we authorize DHL to complete other documents necessary to export this shipment. I/we understand that Shipment Value Protection is available on request, for an extra charge. I/we agree to pay all charges if the recipient or 3rd party refuses to pay. I/we understand that DHL DOES NOT TRANSPORT CASH.

Signature (required) [Signature] Date 1 MAR 07

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☐ Dutiable (Worldwide Priority Express)

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Other _____

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PAYMENT DETAILS (Check, Card No.)

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Type Expires

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Time 10:17 Date 3/1/07

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DHL EXPRESS (USA), INC.

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CHAIN OF CUSTODY

PROJECT:		StarKist Effluent Monitoring - SKS0701.NT												
FROM:		Karen Glatzel, gdc												
		P.O. Box 1238, Trinidad, CA, 95570-1238						707-677-0123			gdcocn@earthlink.net			
TO:		Harvey Jacky, Columbia Analytical Services												
		1317 South 13th Ave, Kelso, WA 98626						360-577-7222						
SAMPLE I.D.	DATE	TIME	MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUESTED								COMMENTS	
					Total-P	NH3-N	NO3+NO2	TKN (AmTest)	Chlorophyll-a	Cu	Zn	Hg		
SKS-1	2/28/2007		Water	2							X	X	X	Total metals
SKS-2	2/28/2007		Water	2							X	X	X	
SKS-3	2/28/2007		Water	2							X	X	X	
SKS-4	2/28/2007		Water	2							X	X	X	
SKS-5	2/28/2007		Water	2							X	X	X	
SKS-6	2/28/2007		Water	2							X	X	X	
SKS-7	2/28/2007		Water	2							X	X	X	
SKS-8	2/28/2007		Water	2							X	X	X	
SAMPLED BY: K. Glatzel <i>KAG</i>				DATE/TIME:		2/28/2007		SPECIAL INSTRUCTIONS/REMARKS: Note: Sample may be as much as 40% seawater Report Dup, MS, MSD as required						
SHIPPED VIA: DHL				DATE/TIME:		3/1/2007								
RELINQUISHED BY: S. Costa <i>SC</i>				DATE/TIME:		3/1/2007								
RECEIVED BY:				DATE/TIME:										
RELINQUISHED BY:				DATE/TIME:										
RECEIVED BY:				DATE/TIME:										

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

COLUMBIA ANALYTICAL SERVICES, INC.

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
Sample Matrix: Water

Service Request No.: K0701734
Date Received: 3/5/07

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 3/5/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples for the reductive precipitation procedure. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

Approved by H6 Date 3/20/07

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
Sample Matrix: Water

Service Request: K0701734
Date Collected: 2/28/07
Date Received: 3/5/07

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0701734-001	1.0	0.05	1	3/5/07	3/12/07	55.0	
SKS-2	K0701734-002	1.0	0.05	1	3/5/07	3/12/07	58.6	
SKS-3	K0701734-003	1.0	0.05	1	3/5/07	3/12/07	67.6	
SKS-4	K0701734-004	1.0	0.05	1	3/5/07	3/12/07	50.1	
SKS-5	K0701734-005	1.0	0.05	1	3/5/07	3/12/07	70.4	
SKS-6	K0701734-006	1.0	0.05	1	3/5/07	3/12/07	42.7	
SKS-7	K0701734-007	1.0	0.05	1	3/5/07	3/12/07	82.5	
SKS-8	K0701734-008	1.0	0.05	1	3/5/07	3/12/07	81.0	
Method Blank	K0701734-MB1	1.0	0.05	1	3/5/07	3/12/07	0.2	B
Method Blank	K0701734-MB2	1.0	0.05	1	3/5/07	3/12/07	0.07	B
Method Blank	K0701734-MB3	1.0	0.05	1	3/5/07	3/12/07	0.1	B

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
Sample Matrix: Water

Service Request: K0701734
Date Collected: 2/28/07
Date Received: 3/5/07
Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Matrix Spike/Duplicate Matrix Spike Summary
 Total Metals

Sample Name: SKS-1
Lab Code: K0701734-001MS, K0701734-001MSD
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level			Sample		Spike Result		MS	DMS	Percent Recovery		CAS Acceptance Limits	Relative Percent Difference	Result Notes
				MS	DMS	Result	MS	DMS	MS	DMS			MS	DMS			
Mercury	METHOD	1631E	1.0	25	25	55.0	81.8	83.3	107	113			71-125		2		

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
LCS Matrix: Water

Service Request: K0701734
Date Collected: NA
Date Received: NA
Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.44	109	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
LCS Matrix: Water

Service Request: K0701734
Date Collected: NA
Date Received: NA
Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Ongoing Precision and Recovery (OPR) Sample Summary

Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.45	109	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
LCS Matrix: Water

Service Request: K0701734
Date Collected: NA
Date Received: NA
Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.32	106	77-123	

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0701734-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	1.56		
Zinc	200.8	1.04	0.10	1	3/13/07	3/15/07	169		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0701734-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.02	1	3/13/07	3/15/07	2.31		
Zinc	200.8	10.80	1.08	10	3/13/07	3/15/07	296		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0701734-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.02		
Zinc	200.8	1.06	0.11	1	3/13/07	3/15/07	178		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0701734-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.02	1	3/13/07	3/15/07	1.43		
Zinc	200.8	1.08	0.11	1	3/13/07	3/15/07	142		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0701734-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.02	1	3/13/07	3/15/07	2.16		
Zinc	200.8	10.20	1.02	10	3/13/07	3/15/07	196		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0701734-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.02	1	3/13/07	3/15/07	1.81		
Zinc	200.8	1.02	0.10	1	3/13/07	3/15/07	166		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0701734-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.98		
Zinc	200.8	10.50	1.05	10	3/13/07	3/15/07	222		

% Solids: 0.0

Comments:

METALS
-1-
INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0701734-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.13		
Zinc	200.8	1.06	0.11	1	3/13/07	3/15/07	159		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected:

Project Name: Starkist Effluent Monitoring

Date Received:

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0701734-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.10	0.01	1	3/13/07	3/15/07	0.01	U	
Zinc	200.8	0.50	0.05	1	3/13/07	3/15/07	0.05	U	

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper	12.5	12.7	102	25.0	25.5	102	23.3	93	200.8
Zinc	25.0	25.8	103	25.0	25.5	102	23.3	93	200.8

Columbia Analytical Services

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	24.2	97	24.9	100	200.8
Zinc				25.0	24.6	98	25.0	100	200.8

Columbia Analytical Services

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	25.1	100			200.8
Zinc				25.0	25.5	102			200.8

METALS
- 2b -
CRDL STANDARD FOR AA AND ICP

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	Initial			Final				
	True	Found	%R	True	Found	%R	Found	%R
Copper				1.0	1.08	108		
Zinc				5.0	5.05	101		

Columbia Analytical Services

METALS

- 3 -

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		Method
	C		1	C	2	C	3	C	C		
Copper	0.10	U	0.10	U	0.10	U	0.10	U			200.8
Zinc	0.50	U	0.50	U	0.50	U	0.50	U			200.8

Columbia Analytical Services

METALS

-3-

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		Method
	C		1	C	2	C	3	C	C		
Copper			0.10	U	0.10	U					200.8
Zinc			0.50	U	0.50	U					200.8

Columbia Analytical Services

METALS

-7-

LABORATORY CONTROL SAMPLE

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

Analyte	Aqueous ug/L			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits	%R	
Copper	2.00	1.98	99						
Zinc	2.00	2.02	101						

Columbia Analytical Services

METALS

- 7 -

LABORATORY CONTROL SAMPLE

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

Analyte	Aqueous ug/L			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits	%R	
Copper	2.00	1.94	97						
Zinc	2.00	1.95	98						

Columbia Analytical Services

METALS

-10-

METHOD DETECTION LIMITS

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICP/ICP-MS ID #: Excell ICPMS

GFAA ID #:

AA ID #:

Analyte	Mass	Back-ground	MRL (ug/L)	MDL (ug/L)	Method
Copper	65		1.00	0.10	200.8
Zinc	66		5.00	0.50	200.8

Comments:

METALS

-12-

ICP LINEAR RANGES (QUARTERLY)

Client: Glatzel da Costa, gdc

Service Request: K0701734

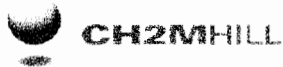
Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICP ID Number: Excell ICPMS

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Copper	15.00	1000.0	200.8
Zinc	15.00	1000.0	200.8

Comments: _____



Steve Costa
Karen Glatzel

216 Driftwood Lane
P.O. Box 1238
Trinidad, CA 95570-1238

707-677-0123 (Tel)
707-677-9210 (Fax)
510-508-5020 (Cell)

18 Jan 2006

Mr. Carl Goldstein
Pacific Insular Area Programs
CMD-1
Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Mr. Peter Peshut
American Samoa Environmental
Protection Agency
American Samoa Government
P.O. Box 368A
Pago Pago, American Samoa 96799

Enclosed is the report for the supplementary effluent mercury test results for StarKist Samoa. The samples were taken concurrently with the August 2005 effluent toxicity sampling for the Joint Cannery Outfall in American Samoa. The sampling and analysis were carried out without problems.

The samples were collected on the 30th and 31st of August 2005 and shipped via DHL on the 1st of September 2005. Please call us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel
Steven L. Costa

cc: Brett Butler, StarKist Samoa; Joe Carney, StarKist Samoa; Tim Ruby, Del Monte;
David Wilson, CH2M HILL.

Encl: Supplemental Effluent Mercury Testing - StarKist Samoa, August 2005 Sampling



TECHNICAL MEMORANDUM

SUPPLEMENTAL EFFLUENT MERCURY TESTING – STARKIST SAMOA AUGUST 2005 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa
Karen Glatzel

Date: 16 January 2006

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

Purpose

As a condition of the StarKist Samoa NPDES permit, a priority pollutant scan of the effluent was required and completed. This information was used to support the application for permit renewal that was submitted to the U.S. Environmental Protection Agency (USEPA), Region 9 in July 2005. StarKist Samoa has approved mixing zones for nutrients (total nitrogen and total phosphorus), ammonia, copper, and zinc. The results of the priority pollutant scan did not reveal any additional constituents of concern with the single exception of mercury. The mercury concentration reported in the priority pollutant scan was 0.27 µg/l, which is above the anticipated revision to the American Samoa Water Quality Standards (ASWQS) of 0.05 µg/l proposed by the American Samoa Environmental Protection Agency (ASEPA).

The reported level of mercury, if representative, will require a mixing zone to achieve compliance with the revised ASWQS. Receiving water concentrations indicate that there is sufficient assimilative capacity to define an approvable mixing zone. To further investigate the mercury levels in the effluent, grab samples were collected at the time of sampling for the August 2005 bioassay testing and sent to Columbia Analytical Services (CAS) laboratory for analysis. This Technical

Memorandum presents the supplemental mercury sampling approach and methods, results, and discussion.

Approach and Methods

Sampling and sample handling followed the standard operating procedures (SOPs) that were developed and then approved for use by the USEPA and ASEPA for previous cannery effluent sampling were used for this supplemental mercury sampling. Between 13:00 on 30 August 2005 and 10:00 on 31 August 2005, samples of final effluent were collected from the StarKist Samoa effluent discharge. Samples were collected from the established effluent sampling sites. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers at each plant. Samples were collected at approximately three-hour intervals over the 24-hour period. The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected CAS laboratory supplied sample bottles were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The sample was shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for mercury are summarized in Table 1. The laboratory data report is provided in Attachment 2. The results of the supplemental analyses are summarized as follows:

- The average mercury concentration for the supplemental samples ($0.117 \mu\text{g/l}$) is less than half the value reported in the priority pollutant scan ($0.27 \mu\text{g/l}$).
- There is little variability among the results from individual grab samples (standard deviation = $0.033 \mu\text{g/l}$).
- All of the samples were above the proposed ASWQS limitation of $0.05 \mu\text{g/l}$, but are below the current ASWQS, which is based on the EPA National Recommended Water Quality Criteria ($0.94 \mu\text{g/l}$).

- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

Table 1 StarKist Samoa Effluent Flows and Mercury Concentrations August 2005			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations ($\mu\text{g/l}$)
1	30 August 2005 13:00	2.44	0.0734
2	16:00	3.05	0.109
3	19:00	3.02	0.101
4	22:00	2.39	0.122
5	31 August 2005 01:00	2.55	0.177
6	04:00	2.80	0.153
7	07:00	2.03	0.112
8	10:00	2.14	0.0912
Minimum		2.03	0.0734
Average		2.55	0.1173
Maximum		3.05	0.1770
Standard Deviation		0.38	0.0334

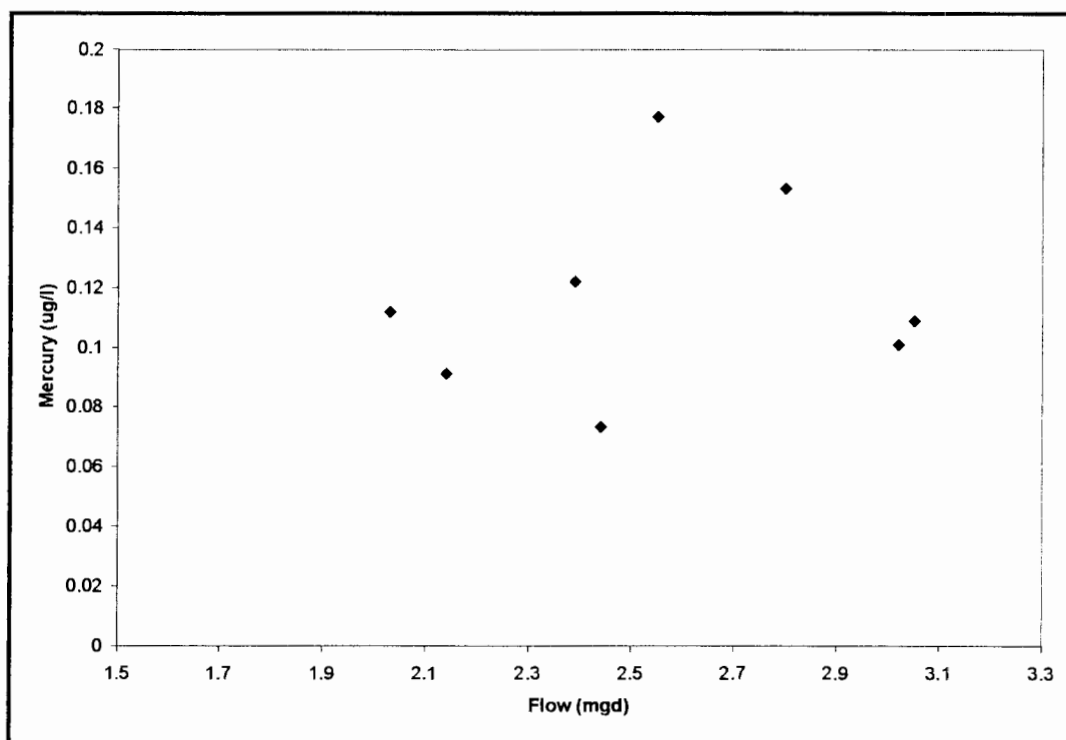


Figure 1.
Scatter plot of StarKist Samoa effluent flow rate and mercury concentration

Discussion

Based on the available data a mixing zone will be required for mercury to comply with the proposed revisions to the ASWQS (0.05 µg/l). The highest value recorded was from the priority pollutant scan (0.27 µg/l). The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge, during the Harbor Water Quality Monitoring studies is 0.0232 µg/l. The dilution required to reduce the effluent concentration to the ASWQS is less than 10:1. Such a dilution is well within the zone of initial dilution (ZID) and occurs within a few meters of the discharge based on previous dilution modeling done for the outfall diffuser. If the maximum effluent concentration from the supplemental monitoring is used (0.177 µg/l) the dilution required is less than 6:1. The calculations are summarized below. The available data clearly indicate that a mixing zone can be established for mercury.

Calculation of Required Dilution
D_R = dilution required to meet ASWQS C_E = effluent concentration C_A = receiving water ambient concentration = 0.0232 µg/l C_S = proposed ASWQS = 0.05 µg/l
<p>For $C_E = 0.27$ µg/l:</p> $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.27 - 0.0232}{0.05 - 0.0232} = 9.2$
<p>For $C_E = 0.177$ µg/l:</p> $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.177 - 0.0232}{0.05 - 0.0232} = 5.7$

ATTACHMENT I

Chain-of-Custody



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Shipment Air Waybill
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782 0788 404

ORIGIN

DESTINATION CODE

1 Payer account number and shipment value protection details

Charge to ☐ Shipper ☐ Receiver ☒ 3rd Party
Payer Account No. 920701629
Shipment Value Protection (see reverse)
☒ Yes Declared Value for Carriage (in US \$) 500
Not all payment options are available in all countries.

2 From (Shipper)

Shipper's Account Number
Contact Name JOE CARNEY

Shipper's Reference (up to 35 characters)

147323.JC.05.TW

Company Name

STARKIST SAMOA

Address

(PO BOX 368)

PAGO PAGO, TUTUILA

AMERICAN SAMOA

Post/ZIP Code (required)

96799

Phone, Fax, or E-mail (required)

684-644-4231

3 To (Receiver)

Company Name

COLUMBIA ANALYTICAL SERVICES

Contact Name

HARVEY JACKY

Delivery Address *DHL Cannot Deliver to a PO Box*

1317 SOUTH 13TH AVENUE

KELSO, WASHINGTON

Country

USA

Post/ZIP Code (required)

98626

Phone, Fax, or E-mail (required)

360-577-7222



7820788404

4 Shipment Details

Total Number of Packages 11
Total Weight (If DHL Express Document packaging used, enter XD) 5.86 lbs
Dimensions (in inches)
Pieces Length Width Height
1 @ 1 x 1 x 1
1 @ 1 x 1 x 1
1 @ 1 x 1 x 1

5 Full Description of Contents

Give Content and Quantity *DHL Does Not Transport Cash*

WATER QUALITY SAMPLES

FOR LABORATORY ANALYSES

NO COMMERCIAL VALUE

6 Dutiable Shipments Only (Customs requirement)

Attach the original and four copies of a Commercial Invoice or Pro Forma.

Export License No./Symbol (if applicable) Receiver's VAT/GST or Shipper's EIN/SSN

Value for Customs (in US \$) (as on Commercial/Pro Forma Invoice)

3550

Schedule B Number / Harmonized Code (if applicable)

TYPE OF EXPORT ☐ Permanent ☐ Repair/Return ☐ Temporary

Destination Duties/Taxes If left blank, Receiver pays duties/taxes.

☐ Receiver ☐ Shipper ☒ Other 920701629

The commodities, technology or software to be exported from the U.S. are in compliance with the U.S. Bureau of Export Administration, Diversion to countries contrary to U.S. law prohibited.

7 Shipper's Authorization (signature required)

I/we agree that DHL's standard terms apply to this shipment and limit DHL's liability for loss or damage to U.S. \$100. The Warsaw Convention may also apply (see reverse). I/we authorize DHL to complete other documents necessary to export this shipment. I/we understand that Shipment Value Protection is available on request, for an extra charge, I/we agree to pay all charges if the recipient or 3rd party refuses to pay. I/we understand that DHL DOES NOT TRANSPORT CASH.

Signature (required) [Signature] Date 1 / 1

8 Products & Services

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☐ USA Overnight

☐ Other

WORLDWIDE EXPRESS

☐ Int'l Express Envelope

☐ Non-Dutiable ☒ WorldFreight

☐ Dutiable ☐ Other

Service Options (extra charges may apply)

☐ Saturday Delivery ☐ Special Pickup

☐ Hold For Pickup* ☐ Delivery Notification

*US deliveries only

Other

Not all products or service options are available to/from all locations.

DIMENSIONAL/CHARGEABLE WEIGHT

lbs

SERVICES

CHARGES

Drop Box #

TOTAL

TRANSPORT COLLECT STICKER No.

PAYMENT DETAILS (Check, Card No.)

No.:

Type Expires

Auth.

PICKED UP BY

Route No.

Time Date

DHL Worldwide Express, Inc., 1200 South Pine Island Road, Plantation, Florida 33324

Shipper's Copy



CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

PAGE 1 OF 1 SR# 10003686 COC #

PROJECT NAME <u>JOINT CANNERY OUTFALL</u>					<div>NUMBER OF CONTAINERS</div> <div>Semivolatile Organics by GC/MS 625 <input type="checkbox"/> 8270 <input type="checkbox"/> Volatile Organics 624 <input type="checkbox"/> 8260 <input type="checkbox"/> Hydrocarbons (See below) Gas <input type="checkbox"/> 8021 <input type="checkbox"/> BTEX <input type="checkbox"/> Fuel Fingerprint (FIO) <input type="checkbox"/> Oil <input type="checkbox"/> NW-HCID Screen <input type="checkbox"/> Oil & Grease/TAPH <input type="checkbox"/> 413 <input type="checkbox"/> 418 <input type="checkbox"/> PCBs <input type="checkbox"/> 1664 SGT <input type="checkbox"/> Aroclors <input type="checkbox"/> 1664 HEM <input type="checkbox"/> Pesticides/Herbicides 608 <input type="checkbox"/> 8081A <input type="checkbox"/> Chlorophenolics - 8141A <input type="checkbox"/> 8151A <input type="checkbox"/> Tri <input type="checkbox"/> Tetra <input type="checkbox"/> PCP <input type="checkbox"/> PAHS 8310 <input type="checkbox"/> SIM <input type="checkbox"/> GC/MS-SIM PAH <input type="checkbox"/> Metals, Total or Dissolved (See list below) Cyanide <input type="checkbox"/> Hex-Chrom <input type="checkbox"/> pH, Cond., Cl, SO₄, PO₄, F, NO₃, BOD, TSS, TDS (circle) NH₃-N, COD, Total-P, TKN, TOC, DOC (circle) TOX 9020 <input type="checkbox"/> AOX 1650 <input type="checkbox"/> 506 <input type="checkbox"/> <u>MERCURY</u></div> <div>1000</div>
PROJECT NUMBER <u>147323, JC. 05, PR-SKS</u>					
PROJECT MANAGER <u>STEVE COSTA - CH2M HILL</u>					
COMPANY/ADDRESS <u>PO BOX 1238 - 216 DRIFTWOOD LN</u>					
<u>TRINIDAD, CA 95570</u>					
PHONE # <u>707-677-0123</u> FAX <u>707-677-9210</u>					
SAMPLE'S SIGNATURE <u>SL Costa</u>					
SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	
SKS-1				<u>WATER CANNERY EFFLUENT</u>	
SKS-2					
SKS-3					
SKS-4					
SKS-5					
SKS-6					
SKS-7					
SKS-8					

REPORT REQUIREMENTS ___ I. Routine Report: Method Blank, Surrogate, as required <input checked="" type="checkbox"/> II. Report Dup., MS, MSD as required ___ III. Data Validation Report (includes all raw data) ___ IV. CLP Deliverable Report ___ V. EDD	INVOICE INFORMATION P.O. # <u>ON FILE</u> Bill To: _____	Circle which metals are to be analyzed: Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg *INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORHTWEST OTHER: _____ (CIRCLE ONE)	
	TURNAROUND REQUIREMENTS ___ 24 hr. ___ 48 hr. ___ 5 Day ___ Standard (10-15 working days) ___ Provide FAX Results Requested Report Date _____	SPECIAL INSTRUCTIONS/COMMENTS: <u>MRL AT 0.05µg/L OR LOWER IS REQUESTED</u> <u>THIS IS FOR STARKIST SAMCHA (SKS) - REPORT</u> <u>SEPARATELY FROM CHICKEN OF THE SEA (COS)</u> <u>ADDITIONAL INFORMATION SENT TO HARVEY JACKY</u> <u>VIA EMAIL</u>	

RELINQUISHED BY: <u>SL Costa</u> Signature <u>SL COSTA</u> Printed Name Date/Time <u>CH2M HILL</u> Firm	RECEIVED BY: <u>Tracy Clark</u> Signature <u>Clark</u> Printed Name Date/Time <u>9/3/10 1570</u> Firm	RELINQUISHED BY: Signature _____ Date/Time _____ Printed Name _____ Firm _____	RECEIVED BY: Signature _____ Date/Time _____ Printed Name _____ Firm _____
---	---	---	---

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

October 17, 2005

Service Request No: K0503686⁶

Steve Costa
CH2M Hill
216 Driftwood Lane
P.O. Box 1238
Trinidad, CA 95570-1238

RE: Joint Cannery Outfall/147323.JC.05.PR-SKS

Dear Steve:

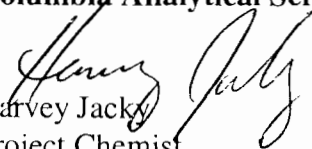
Enclosed are the results of the sample(s) submitted to our laboratory on September 7, 2005. For your reference, these analyses have been assigned our service request number K0503686.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAC standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260.


Respectfully submitted,

Columbia Analytical Services, Inc.



Harvey Jacky
Project Chemist

HJ/jeb

Page 1 of 

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
 - i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
 - i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M Hill	Service Request No.:	K0503686
Project:	Joint Cannery Outfall / 147323.JC.05.PR-SKS	Date Received:	9/7/05
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 9/7/05. The following discrepancies were noted upon initial sample inspection. The temperatures of the shipping coolers were above the upper recommended limit of 6 °C. The exceptions are also noted on the cooler receipt and preservation form included in this data package. Except as noted, the samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples were observed.

Approved by HS Date 10/10/05

00015

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
Sample Matrix: Water

Service Request: K0503686
Date Collected:
Date Received: 9/7/05

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0503686-001	5.0	0.5	5	10/12/05	10/13/05	73.4	
SKS-2	K0503686-002	5.0	0.5	5	10/12/05	10/13/05	109	
SKS-3	K0503686-003	5.0	0.5	5	10/12/05	10/13/05	101	
SKS-4	K0503686-004	5.0	0.5	5	10/12/05	10/13/05	122	
SKS-5	K0503686-005	5.0	0.5	5	10/12/05	10/13/05	117	
SKS-6	K0503686-006	5.0	0.5	5	10/12/05	10/13/05	153	
SKS-7	K0503686-007	5.0	0.5	5	10/12/05	10/13/05	112	
SKS-8	K0503686-008	5.0	0.5	5	10/12/05	10/13/05	91.2	
Method Blank 1	K0503686-MB1	1.0	0.1	1	10/12/05	10/13/05	ND	
Method Blank 2	K0503686-MB2	1.0	0.1	1	10/12/05	10/13/05	ND	
Method Blank 3	K0503686-MB3	1.0	0.1	1	10/12/05	10/13/05	ND	

00011

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
Sample Matrix: Water

Service Request: K0503686
Date Collected: NA
Date Received: NA
Date Extracted: 10/12/05
Date Analyzed: 10/13/05

Matrix Spike/Duplicate Matrix Spike Summary
 Total Metals

Sample Name: Batch QC
Lab Code: K0503565-002S, K0503565-002DS
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level		Sample Result	Spike Result		Percent Recovery		CAS Acceptance Limits	Relative Percent Difference	Result Notes
				MS	DMS		MS	DMS	MS	DMS			
Mercury	METHOD	1631E	1.0	25.0	25.0	5.9	34.5	33.6	114	111	71-125	3	

00012

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
LCS Matrix: Water

Service Request: K0503686
Date Collected: NA
Date Received: NA
Date Extracted: 10/12/05
Date Analyzed: 10/13/05

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial) **Units:** ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.07	101	77-123	

00013

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
LCS Matrix: Water

Service Request: K0503686
Date Collected: NA
Date Received: NA
Date Extracted: 10/12/05
Date Analyzed: 10/13/05

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.14	103	77-123	

00014

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
LCS Matrix: Water

Service Request: K0503686
Date Collected: NA
Date Received: NA
Date Extracted: 10/12/05
Date Analyzed: 10/13/05

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample
Lab Code:
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS	Result Notes
						Percent Recovery Acceptance Limits	
Mercury	METHOD	1631E	5.00	5.03	101	77-123	

TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING – STARKIST SAMOA MARCH 2006 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa
Karen Glatzel

Date: 24 April 2006

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

Purpose

In March 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered high rate diffuser in approximately 176 feet of water. The SKS NPDES Permit renewal application¹ indicated that mercury will require a zone of mixing (ZOM) based on recent changes in the American Samoa Water Quality Standards (ASWQS). Previous mercury sampling has been conducted for informational purposes. The results of this effluent mercury analysis will be included in the mercury database for establishing a ZOM for mercury.

The existing SKS NPDES Permit and renewal application has a permitted ZOM for both copper and zinc. Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data are reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The

¹ Submitted to USEPA in July 2005.

TECHNICAL MEMORANDUM



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¹ Submitted to USEPA in July 2005.

results reported here are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

Approach and Methods

Sampling and sample handling methods followed the standard operating procedures (SOPs) that were previously developed and approved by the USEPA and the American Samoa Environmental Protection Agency (ASEPA) for cannery effluent sampling. Between 09:00 on 28 February 2006 and 06:00 on 01 March 2006, samples of final effluent were collected from the StarKist Samoa effluent discharge. Samples were collected from the established effluent sampling site. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers at each cannery. Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected, laboratory supplied mercury and ICP metals (for copper and zinc) sample bottles were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1, 2, and 3, for mercury, copper, and zinc, respectively. The laboratory data report is provided in Attachment 2.

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS March 2006 samples (0.126 µg/l; Table 1) is less than half the value reported in the priority pollutant scan³ (0.27 µg/l) and close to the average of supplemental mercury testing conducted in August 2005 (0.117 µg/l).
- There was some variability among the results from individual grab samples (standard deviation = 0.072 µg/l), primarily because of one value of 0.298 µg/l that is approximately three times higher than other values (Table 1).
- All of the samples were above the recently revised ASWQS water quality standard criterion of 0.05 µg/l, and all values are below the USEPA National Recommended Water Quality Criteria (0.94 µg/l). The current NPDES Permit does not have a limitation for mercury.

² Results of the SKS metals analyses and the bioassay testing are presented in separate Technical Memorandums.

³ Conducted in September 2004.

- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS March 2006 samples was 3.120 µg/l (Table 2).
- There was noticeable variability among the results from the eight individual copper grab samples (standard deviation = 0.996 µg/l) with a range between 1.79 µg/l and 4.83 µg/l (Table 2).
- Four out of eight copper samples were below the ASWQS criterion⁴ of 3.1 µg/l, three copper samples were measured near 3.6 µg/l. One sample (Grab 8) was measured at 4.830 µg/l, still well below the NPDES permit limitation.
- There appears to be no significant relationship between the flow rate and the effluent copper concentration as shown in Figure 2.

The results of the sample testing for zinc indicate:

- The average zinc concentration for the March 2006 samples was 237 µg/l (Table 3).
- There was a noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 60) with a range between 146 µg/l and 340 µg/l (Table 3).
- All of the eight zinc samples were above the ASWQS criterion⁵ of 81 µg/l. All values were well below the current NPDES Permit limitation.
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

Discussion

Each of the metals under consideration has been previously measured in the effluent above the ASWQS criteria. A ZOM for mercury will be required in the renewal NPDES permit. The existing ZOMs for copper and zinc will need to be retained in the renewal NPDES permit. Table 4 provides the calculations necessary to show ASWQS will be achieved within the zone of initial dilution.

Mercury: Based on the available data a mixing zone will be required for mercury to comply with the recent revisions to the ASWQS (0.05 µg/l). The highest value recorded from the March 2006 sampling was 0.298 µg/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge; during the Harbor Water Quality Monitoring studies was 0.0232 µg/l.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

The dilution required to reduce the effluent concentration to the ASWQS is less than 10.3:1. Such a dilution is well within the zone of initial dilution (ZID) and occurs within a few meters of the discharge based on previous dilution modeling done for the outfall diffuser.

Copper: A mixing zone for copper already exists in the NPDES Permit. A check of the dilution required for copper to comply with the ASWQS (3.1 µg/l) is calculated below. The highest value of copper recorded from the March 2006 sampling was 4.830 µg/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge was 0.83 µg/l⁶.

The dilution required to reduce the effluent concentration to the ASWQS is less than 1.8:1. This dilution is well within the zone of initial dilution (ZID) and occurs within a meter of the diffuser based on previous dilution modeling done for the outfall diffuser.

Zinc: A mixing zone already exists for zinc and is documented in the NPDES Permit. The dilution calculations for zinc to comply with the ASWQS (81 µg/l), are provided below. The highest value recorded from the March 2006 sampling was 340 µg/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge; during the Harbor Water Quality Monitoring studies was 5.5 µg/l⁷.

The dilution required to reduce the effluent concentration to the ASWQS is less than 4.4:1. This dilution is well within the zone of initial dilution (ZID) and occurs within two meters of the diffuser based on previous dilution modeling done for the outfall diffuser.

⁶ This value for copper is the highest receiving water concentration measured, during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

⁷ This value for zinc is the highest receiving water concentration measured excluding outliers greater than three standard deviations from the mean.

Table 1 StarKist Samoa Effluent Flows and Mercury Concentrations 28 February - 1 March 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations ($\mu\text{g/l}$)
1	28 Feb 2006 09:00	1.98	0.107
2	12:00	2.63	0.083
3	15:00	2.60	0.298
4	18:00	1.94	0.088
5	21:00	1.95	0.096
6	24:00	2.16	0.092
7	1 March 2006 03:00	2.53	0.102
8	06:00	2.15	0.145
Minimum		1.94	0.083
Average		2.24	0.126
Maximum		2.63	0.298
Standard Deviation		0.30	0.072

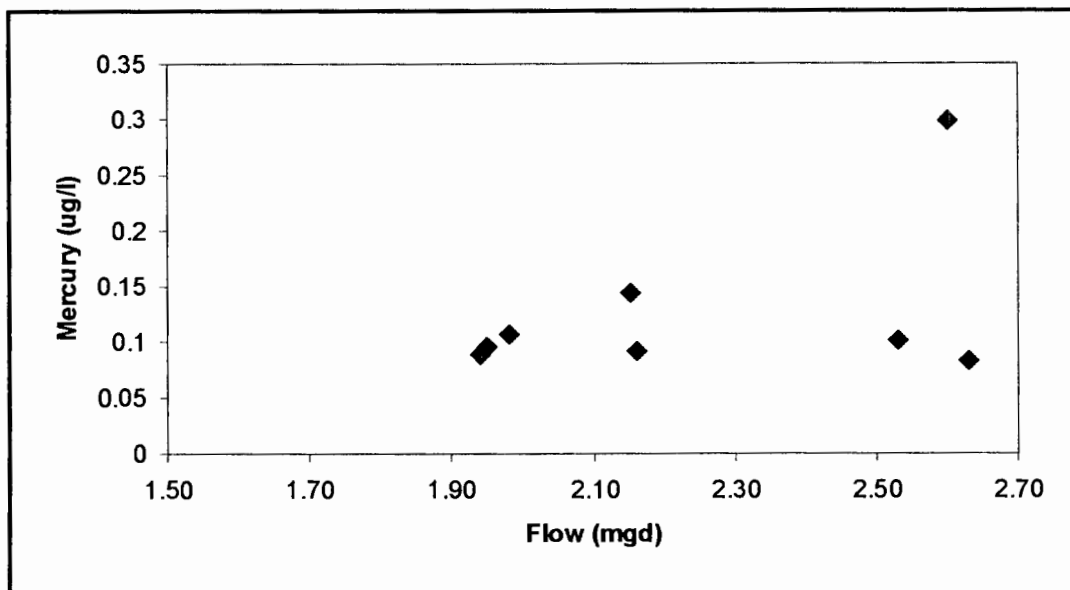


Figure 1.
Scatter plot of StarKist Samoa effluent flow rate and mercury concentration

Table 2 StarKist Samoa Effluent Flows and Copper Concentrations 28 February - 1 March 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Copper Concentrations ($\mu\text{g/l}$)
1	28 Feb 2006 09:00	1.98	3.630
2	12:00	2.63	2.820
3	15:00	2.60	2.170
4	18:00	1.94	3.610
5	21:00	1.95	3.670
6	24:00	2.16	2.440
7	1 March 2006 03:00	2.53	1.790
8	06:00	2.15	4.830
Minimum		1.94	1.790
Average		2.24	3.120
Maximum		2.63	4.830
Standard Deviation		0.30	0.996

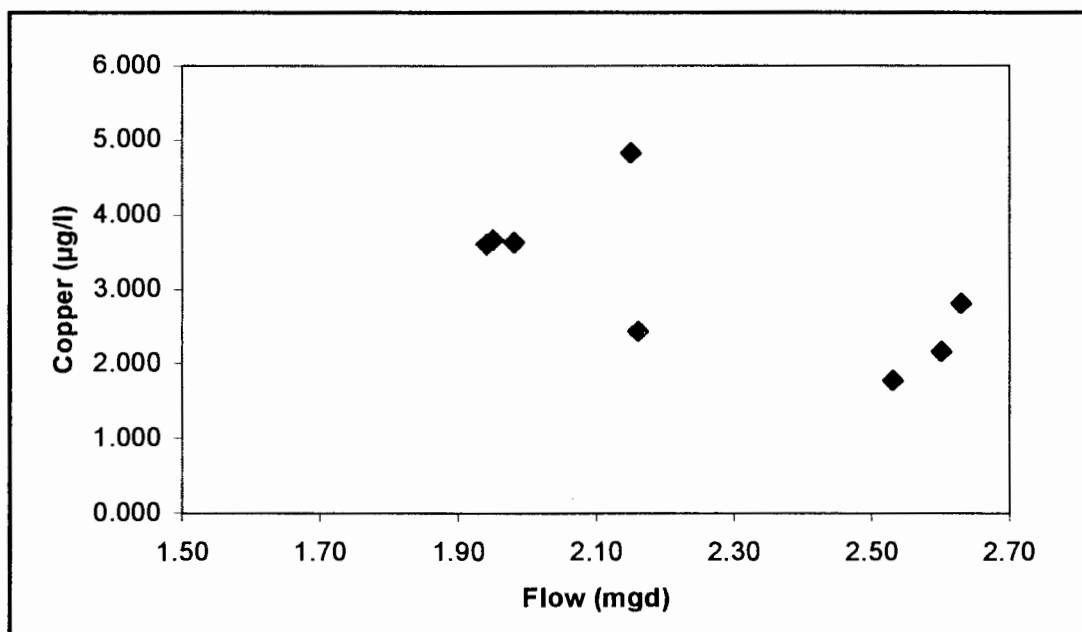


Figure 2.
Scatter plot of StarKist Samoa effluent flow rate and copper concentration

Table 3 StarKist Samoa Effluent Flows and Zinc Concentrations 28 February - 1 March 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Zinc Concentrations ($\mu\text{g/l}$)
1	28 Feb 2006 09:00	1.98	264
2	12:00	2.63	196
3	15:00	2.60	146
4	18:00	1.94	226
5	21:00	1.95	340
6	24:00	2.16	267
7	1 March 2006 03:00	2.53	190
8	06:00	2.15	266
Minimum		1.94	146
Average		2.24	237
Maximum		2.63	340
Standard Deviation		0.30	60

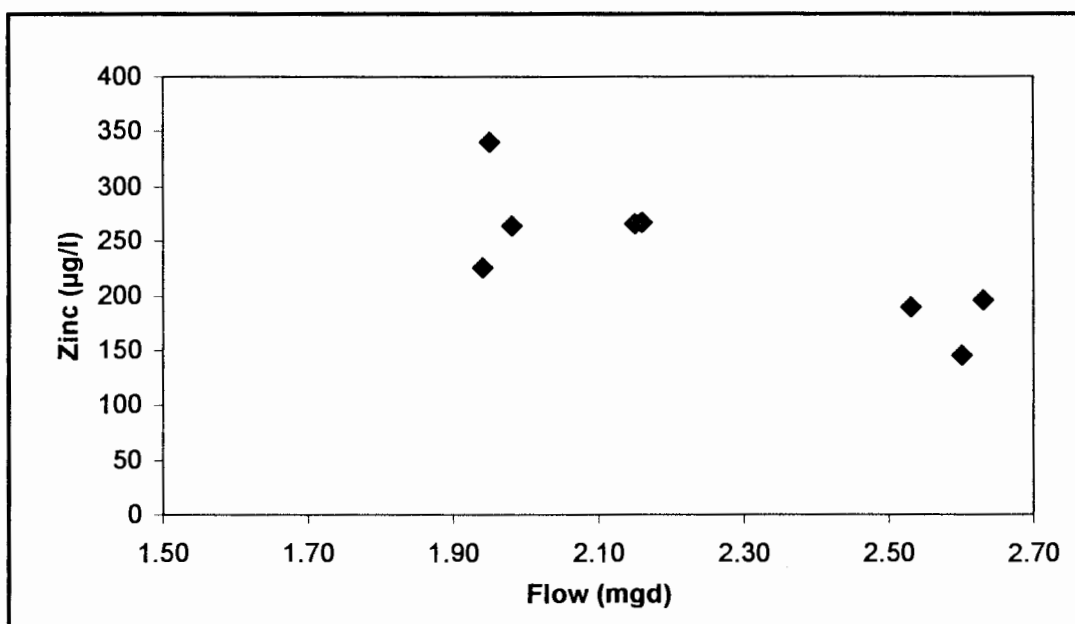


Figure 3.
Scatter plot of StarKist Samoa effluent flow rate and zinc concentration

Table 4. Calculations of Required Dilution	
Calculation of Required Dilution for Mercury	
D _R = dilution required to meet ASWQS C _E = effluent concentration C _A = receiving water ambient concentration = 0.0232 µg/l C _S = proposed ASWQS = 0.05 µg/l	
For C _E = 0.298 µg/l: $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.298 - 0.0232}{0.05 - 0.0232} = 10.3$	
Calculation of Required Dilution for Copper	
D _R = dilution required to meet ASWQS C _E = effluent concentration C _A = receiving water ambient concentration = 0.83 µg/l C _S = ASWQS = 3.1 µg/l	
For C _E = 4.830 µg/l: $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{4.830 - 0.83}{3.1 - 0.83} = 1.8$	
Calculation of Required Dilution for Zinc	
D _R = dilution required to meet ASWQS C _E = effluent concentration C _A = receiving water ambient concentration = 5.5 µg/l C _S = ASWQS = 81 µg/l	
For C _E = 340 µg/l: $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{340 - 5.5}{81 - 5.5} = 4.4$	

ATTACHMENT I

Chain-of-Custody

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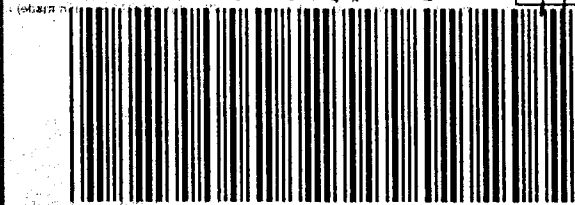
Charge to ☐ Shipper ☐ Receiver ☒ 3rd Party
Payer Account No. 920701629
Shipment Value Protection (see reverse)
☐ Yes Declared Value for Carriage (in US \$) _____
Not all payment options are available in all countries.

2 From (Shipper)

Shipper's Account Number 920701629 Contact Name JOE CARNEY
Shipper's Reference (up to 35 characters) 147323.JQ.06.NT
Company Name STARKIST SAMOA
Address PAGO PAGO
AMERICAN SAMOA
Post/ZIP Code (required) 96799 Phone, Fax, or E-mail (required) 808-644-4231

3 To (Receiver)

Company Name COLUMBIA ANALYTICAL SERVICES
Contact Name HARVEY JACKY
Delivery Address DHL Cannot Deliver to a PO Box
1317 SOUTH 13TH AVE
KELSO, WA
Country USA
Post/ZIP Code (required) 98626 Phone, Fax, or E-mail (required) 360-577-7222



7820788415

4 Shipment Details

Total Number of Packages 8 Total Weight 395 Dimensions (in inches) Pieces Length Width Height
8 23 14 13
lb

5 Full Description of Contents

Give Content and Quantity DHL Does Not Transport Cash
WATER QUALITY SAMPLES FOR
LABORATORY ANALYSIS
NO COMMERCIAL VALUE

6 Dutiable Shipments Only (Customs requirement)

Attach the original and four copies of a Commercial Invoice or Pro Forma.
Export License No./Symbol (if applicable) Receiver's VAT/GST or Shipper's EIN/SSN
Value for Customs (in US \$) 8400 Schedule B Number / Harmonized Code (if applicable)
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Specify approved account number

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I/we agree that DHL's standard terms apply to this shipment and limit DHL's liability for loss or damage to U.S. \$100. The Warsaw Convention may also apply (see reverse). I/we authorize DHL to complete other documents necessary to export this shipment. I/we understand that Shipment Value Protection is available on request, for an extra charge. I/we agree to pay all charges if the recipient or 3rd party refuses to pay. I/we understand that DHL DOES NOT TRANSPORT CASH.
Signature (required) Joe Carney Date 3/2/06

8 Products & Services

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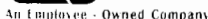
PAYMENT DETAILS (Check, Card No.)

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Type Expires
Auth.

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Route No. 1256
Time 11:45 Date 3/2

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PAGE 1 OF 2 SR#: X0601753 COC # _____

[illegible]

RCOC #1 06/03

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

March 16, 2006

Service Request No: K0601753

Steve Costa
CH2M Hill
216 Driftwood Lane
P.O. Box 1238
Trinidad, CA 95570-1238

RE: Joint Cannery Effluent Monitoring/147323.JC.06.NT

Dear Steve:

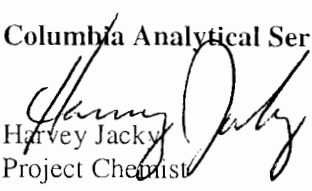
Enclosed are the results of the sample(s) submitted to our laboratory on March 06, 2006. For your reference, these analyses have been assigned our service request number K0601753.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAC standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260.

Respectfully submitted,

Columbia Analytical Services, Inc.


Harvey Jacky
Project Chemist

HJ/jm

Page 1 of 89

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client: CH2M Hill Service Request No.: K0601753
Project: Joint Cannery Effluent Monitoring / 147323.JC.06.NT
Date Received: 3/6/06 Sample Matrix: Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory; Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 3/6/06. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

Approved by _____

 Date 3/20/06

00005

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
Sample Matrix: Water

Service Request: K0601753
Date Collected: 3/1/06
Date Received: 3/6/06

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0601753-001	5.0	0.5	5	3/7/06	3/13/06	107	
SKS-2	K0601753-002	5.0	0.5	5	3/7/06	3/13/06	82.6	
SKS-3	K0601753-003	5.0	0.5	5	3/7/06	3/13/06	298	
SKS-4	K0601753-004	5.0	0.5	5	3/7/06	3/13/06	87.5	
SKS-5	K0601753-005	5.0	0.5	5	3/7/06	3/13/06	95.9	
SKS-6	K0601753-006	5.0	0.5	5	3/7/06	3/13/06	92.3	
SKS-7	K0601753-007	5.0	0.5	5	3/7/06	3/13/06	102	
SKS-8	K0601753-008	5.0	0.5	5	3/7/06	3/13/06	145	
Method Blank 1	K0601753-MB1	1.0	0.1	1	3/7/06	3/13/06	ND	
Method Blank 2	K0601753-MB2	1.0	0.1	1	3/7/06	3/13/06	ND	
Method Blank 3	K0601753-MB3	1.0	0.1	1	3/7/06	3/13/06	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
Sample Matrix: Water

Service Request: K0601753
Date Collected: NA
Date Received: NA
Date Extracted: 3/7/06
Date Analyzed: 3/13/06

Matrix Spike/Duplicate Matrix Spike Summary
Total Metals

Sample Name: Batch QC
Lab Code: K0601634-001S, K0601634-001SD
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level			Sample Spike Result			Percent Recovery		CAS Acceptance Limits	Relative Percent Difference	Result Notes
				MS	DMS	Result	MS	DMS	MS	DMS				
Mercury	METHOD	1631E	1.0	25	25	17.4	46.4	44.6	116	109	71-125	4		

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
LCS Matrix: Water

Service Request: K0601753
Date Collected: NA
Date Received: NA
Date Extracted: 3/7/06
Date Analyzed: 3/13/06

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.35	107	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
LCS Matrix: Water

Service Request: K0601753
Date Collected: NA
Date Received: NA
Date Extracted: 3/7/06
Date Analyzed: 3/13/06

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.45	109	77-123	

00013

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
LCS Matrix: Water

Service Request: K0601753
Date Collected: NA
Date Received: NA
Date Extracted: 3/7/06
Date Analyzed: 3/13/06

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample
Lab Code: K0601753-QCS
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.30	106	77-123	

00014

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0601753-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.630		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	264		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0601753-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.820		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	196		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0601753-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.170		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	146		

% Solids: 0.0

Comments:

00038

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0601753-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.610		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	226		

% Solids: 0.0

Comments:

00039

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0601753-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.670		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	340		

% Solids: 0.0

Comments:

00040

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0601753-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.440		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	267		

% Solids: 0.0

Comments:

00041

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µg/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0601753-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	1.790		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	190		

% Solids: 0.0

Comments:

METALS
-1-
INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0601753-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	4.830		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	266		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected:

Project Name: Joint Cannery Effluent Monitoring

Date Received:

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0601753-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.100	0.005	1	3/10/06	3/14/06	0.005	U	
Zinc	200.8	0.50	0.02	1	3/10/06	3/14/06	0.02	B	

% Solids: 0.0

Comments:

00044

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit.

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/l

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper	12.5	12.4	99	25.0	25.7	103	25.0	100	200.8
Zinc	25.0	25.1	100	25.0	25.3	101	24.8	99	200.8

00045

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit.

ICV Source:

CCV Source: Various

Concentration Units: ug/l

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	25.1	100			200.8
Zinc				25.0	24.9	100			200.8

00046

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

Concentration Units: ug/l

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	Initial True	Initial Found	Initial %R	Final Found	Final %R
Copper				1.0	1.01	101		
Zinc				5.0	4.57	91		

METALS

-3-

BLANKS

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		Method
		C	1	C	2	C	3	C	C		
Copper	0.050	U	0.050	U	0.05	U	0.050	U			200.8
Zinc	0.20	U	0.20	U	0.20	U	0.20	U			200.8

00048

METALS

- 7 -

LABORATORY CONTROL SAMPLE

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

Analyte	Aqueous ug/L			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits	%R	
Copper	2.00	1.94	97						
Zinc	2.00	1.92	96						

METALS

-7-

LABORATORY CONTROL SAMPLE

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

Analyte	Aqueous ug/L			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits	%R	
Copper	2.00	2.00	100						
Zinc	2.00	1.94	97						

METALS

-10-

METHOD DETECTION LIMITS

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

ICP/ICP-MS ID #: Excell ICPMS

GFAA ID #:

AA ID #:

Analyte	Mass	Back-ground	MRL (ug/L)	MDL (ug/L)	Method
Copper	65		1.000	0.050	200.8
Zinc	66		5.00	0.20	200.8

Comments

00051

METALS

-12-

ICP LINEAR RANGES (QUARTERLY)

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit.

ICP ID Number: Excell ICPMS

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Copper	15.00	500.0	200.8
Zinc	15.00	500.0	200.8

Comments: _____

00052

TECHNICAL MEMORANDUM

SUPPLEMENTAL EFFLUENT MERCURY TESTING – STARKIST SAMOA AUGUST 2005 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa
Karen Glatzel

Date: 16 January 2006

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

Purpose

As a condition of the StarKist Samoa NPDES permit, a priority pollutant scan of the effluent was required and completed. This information was used to support the application for permit renewal that was submitted to the U.S. Environmental Protection Agency (USEPA), Region 9 in July 2005. StarKist Samoa has approved mixing zones for nutrients (total nitrogen and total phosphorus), ammonia, copper, and zinc. The results of the priority pollutant scan did not reveal any additional constituents of concern with the single exception of mercury. The mercury concentration reported in the priority pollutant scan was 0.27 µg/l, which is above the anticipated revision to the American Samoa Water Quality Standards (ASWQS) of 0.05 µg/l proposed by the American Samoa Environmental Protection Agency (ASEPA).

The reported level of mercury, if representative, will require a mixing zone to achieve compliance with the revised ASWQS. Receiving water concentrations indicate that there is sufficient assimilative capacity to define an approvable mixing zone. To further investigate the mercury levels in the effluent, grab samples were collected at the time of sampling for the August 2005 bioassay testing and sent to Columbia Analytical Services (CAS) laboratory for analysis. This Technical

Memorandum presents the supplemental mercury sampling approach and methods, results, and discussion.

Approach and Methods

Sampling and sample handling followed the standard operating procedures (SOPs) that were developed and then approved for use by the USEPA and ASEPA for previous cannery effluent sampling were used for this supplemental mercury sampling. Between 13:00 on 30 August 2005 and 10:00 on 31 August 2005, samples of final effluent were collected from the StarKist Samoa effluent discharge. Samples were collected from the established effluent sampling sites. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers at each plant. Samples were collected at approximately three-hour intervals over the 24-hour period. The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected CAS laboratory supplied sample bottles were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The sample was shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for mercury are summarized in Table 1. The laboratory data report is provided in Attachment 2. The results of the supplemental analyses are summarized as follows:

- The average mercury concentration for the supplemental samples (0.117 µg/l) is less than half the value reported in the priority pollutant scan (0.27 µg/l).
- There is little variability among the results from individual grab samples (standard deviation = 0.033 µg/l).
- All of the samples were above the proposed ASWQS limitation of 0.05 µg/l, but are below the current ASWQS, which is based on the EPA National Recommended Water Quality Criteria (0.94 µg/l).

- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

Table 1 StarKist Samoa Effluent Flows and Mercury Concentrations August 2005			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations ($\mu\text{g/l}$)
1	30 August 2005 13:00	2.44	0.0734
2	16:00	3.05	0.109
3	19:00	3.02	0.101
4	22:00	2.39	0.122
5	31 August 2005 01:00	2.55	0.177
6	04:00	2.80	0.153
7	07:00	2.03	0.112
8	10:00	2.14	0.0912
Minimum		2.03	0.0734
Average		2.55	0.1173
Maximum		3.05	0.1770
Standard Deviation		0.38	0.0334

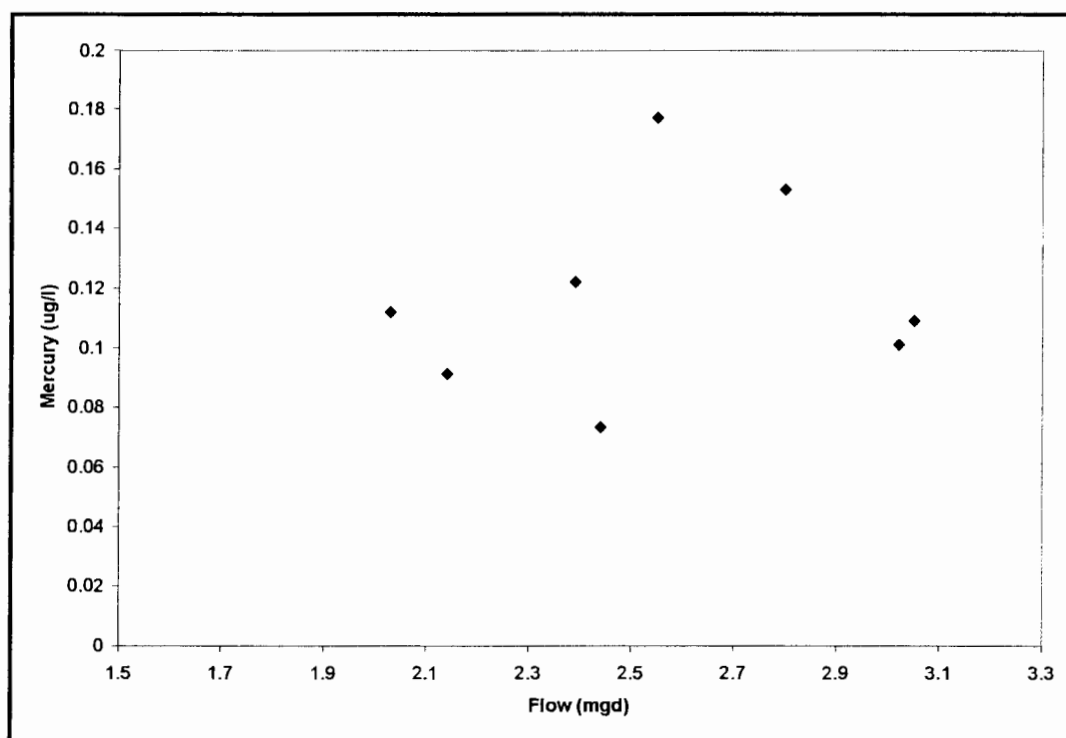


Figure 1.

Scatter plot of StarKist Samoa effluent flow rate and mercury concentration

Discussion

Based on the available data a mixing zone will be required for mercury to comply with the proposed revisions to the ASWQS (0.05 µg/l). The highest value recorded was from the priority pollutant scan (0.27 µg/l). The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge, during the Harbor Water Quality Monitoring studies is 0.0232 µg/l. The dilution required to reduce the effluent concentration to the ASWQS is less than 10:1. Such a dilution is well within the zone of initial dilution (ZID) and occurs within a few meters of the discharge based on previous dilution modeling done for the outfall diffuser. If the maximum effluent concentration from the supplemental monitoring is used (0.177 µg/l) the dilution required is less than 6:1. The calculations are summarized below. The available data clearly indicate that a mixing zone can be established for mercury.

Calculation of Required Dilution
D_R = dilution required to meet ASWQS C_E = effluent concentration C_A = receiving water ambient concentration = 0.0232 µg/l C_S = proposed ASWQS = 0.05 µg/l
<p>For $C_E = 0.27$ µg/l:</p> $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.27 - 0.0232}{0.05 - 0.0232} = 9.2$
<p>For $C_E = 0.177$ µg/l:</p> $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.177 - 0.0232}{0.05 - 0.0232} = 5.7$

ATTACHMENT I

Chain-of-Custody



Process and Track your shipment online: <http://www.dhl-usa.com>
1-800-CALL-DHL in USA only **Ship Out Air Waybill**
(Non negotiable)

782 0788 404

1 Payer account number and shipment value protection details

Charge to ☐ Shipper ☐ Receiver ☒ 3rd Party
Payer Account No. 920741629
Shipment Value Protection (see reverse)
☒ Yes Declared Value for Carriage (in US \$) 500 Not all payment options are available in all countries.

2 From (Shipper)

Shipper's Account Number
Contact Name JOE CARNET

Shipper's Reference (up to 35 characters)
147323.JC.05.TW

Company Name
STARKIST SAMOA

Address (PO BOX 368)
PAGO PAGO, TUTUILA
AMERICAN SAMOA

Post/ZIP Code (required) 96799 Phone, Fax, or E-mail (required) 684-644-4231

3 To (Receiver)

Company Name
COLUMBIA ANALYTICAL SERVICES

Contact Name
HARVEY JACKY

Delivery Address *DHL Cannot Deliver to a PO Box*
1317 SOUTH 13TH AVENUE
KELSO, WASHINGTON

Country USA

Post/ZIP Code (required) 98626 Phone, Fax, or E-mail (required) 360-577-7222



7820788404

4 Shipment Details

Total Number of Packages 11 Total Weight 500 lbs
If DHL Express Document packaging used, enter XD. Pieces 1 @ 1 x 1 x 14
Dimensions (in inches) Length Width Height

5 Full Description of Contents

Give Content and Quantity *DHL Does Not Transport Cash*
WATER QUALITY SAMPLES
FOR LABORATORY ANALYSES
NO COMMERCIAL VALUE

6 Dutiable Shipments Only (Customs requirement)

Attach the original and four copies of a Commercial Invoice or Pro Forma.
Export License No./Symbol (if applicable) Receiver's VAT/GST or Shipper's EIN/SSN

Value for Customs (in US \$) 3550 Schedule B Number / Harmonized Code (if applicable)

TYPE OF EXPORT ☐ Permanent ☐ Repair/Return ☐ Temporary

Destination Duties/Taxes If left blank, Receiver pays duties/taxes

☐ Receiver ☐ Shipper ☒ Other 920741629

The commodities, technology or software to be exported from the U.S. are in compliance with the U.S. Bureau of Export Administration. Diversion to countries contrary to U.S. law prohibited.

7 Shipper's Authorization (signature required)

I/we agree that DHL's standard terms apply to this shipment and limit DHL's liability for loss or damage to U.S. \$100. The Warsaw Convention may also apply (see reverse). I/we authorize DHL to complete other documents necessary to export this shipment. I/we understand that Shipment Value Protection is available on request, for an extra charge. I/we agree to pay all charges if the recipient or 3rd party refuses to pay. I/we understand that DHL DOES NOT TRANSPORT CASH.

Signature (required) [Signature] Date 1 / 1

ORIGIN

DESTINATION CODE

8 Products & Services

DOMESTIC EXPRESS
☐ U.S. Express Envelope
☐ USA Overnight
☐ Other

OP GLOBAL MAIL
☐ Priority
☐ Standard
☐ IPA
☐ ISAL
☐ DomFlats

WORLDWIDE EXPRESS
☐ Intl Express Envelope

☐ Non-Dutiable ☒ WorldFreight
☐ Dutiable ☐ Other

Service Options (extra charges may apply)

☐ Saturday Delivery ☐ Special Pickup
☐ Hold For Pickup* ☐ Delivery Notification
*US deliveries only

Other
Not all products or service options are available to/from all locations.

DIMENSIONAL/CHARGEABLE WEIGHT

lbs

SERVICES CHARGES

Drop Box # TOTAL

TRANSPORT COLLECT STICKER No.

PAYMENT DETAILS (Check, Card No.)

No.:

Type Expires

Auth.

PICKED UP BY

Route No.

Time Date

DHL Worldwide Express, Inc., 1200 South Pine Island Road, Plantation, Florida 33324

Shipper's Copy



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PAGE 1 OF 1 SR# 10003686 COC # _____

PROJECT NAME <u>JOINT CANNERY OUTFALL</u>					<div>NUMBER OF CONTAINERS</div> <div>Semi-volatile Organics by GC/MS 625 <input type="checkbox"/> 8270 <input type="checkbox"/> Volatile Organics 624 <input type="checkbox"/> 8260 <input type="checkbox"/> Hydrocarbons (*see below) Gas <input type="checkbox"/> 8021 <input type="checkbox"/> BTEX <input type="checkbox"/> <input type="checkbox"/> Fuel Fingerprint (FIQ) <input type="checkbox"/> NW-HCID Oil <input type="checkbox"/> Oil & Grease/TPH 413.1 <input type="checkbox"/> 418.1 <input type="checkbox"/> PCB's <input type="checkbox"/> 1664 SGT <input type="checkbox"/> Aroclors <input type="checkbox"/> 1664 HEM <input type="checkbox"/> Pesticides/Herbicides 608 <input type="checkbox"/> 8081A <input type="checkbox"/> Chlorophenolics Tri <input type="checkbox"/> 8141A <input type="checkbox"/> 8151A <input type="checkbox"/> PAHs <input type="checkbox"/> 8310 <input type="checkbox"/> PCP <input type="checkbox"/> GC/MS-SIM <input type="checkbox"/> PAH <input type="checkbox"/> Metals, Total or Dissolved (See list below) Cyanide <input type="checkbox"/> Hex-Chrom <input type="checkbox"/> pH, Cond., Cl, SO₄, PO₄, F, NO₃, NO₂, BOD, TSS, TDS, DOC (circle) NH₃-N, COD, Total-P, TKN, TOC, TOX 9020 <input type="checkbox"/> AOX 1650 <input type="checkbox"/> 506 <input type="checkbox"/> <u>MERCURY</u></div>
PROJECT NUMBER <u>147323, JC, OS, PR-SKS</u>					
PROJECT MANAGER <u>STEVE COSTA - CH2M HILL</u>					
COMPANY/ADDRESS <u>PO BOX 1238 - 216 DRIFTWOOD LN</u> <u>TRINIDAD, CA 95570</u>					
PHONE # <u>707-677-0123</u> FAX # <u>707-677-9210</u>					
SAMPLE'S SIGNATURE <u>SA Costa</u>					
SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	
SKS-1				<u>WATER - CANNERY EFFLUENT</u>	
SKS-2					
SKS-3					
SKS-4					
SKS-5					
SKS-6					
SKS-7					
SKS-8					

00007

REMARKS

NOTE!
UP TO
50%
SEAWATER

X
X
X
X
X
X
X
X

REPORT REQUIREMENTS

- ___ I. Routine Report: Method Blank, Surrogate, as required
- X II. Report Dup., MS, MSD as required
- ___ III. Data Validation Report (includes all raw data)
- ___ IV. CLP Deliverable Report
- ___ V. EDD

INVOICE INFORMATION

P.O. # ON FILE

Bill To: _____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.

___ 5 Day

___ Standard (10-15 working days)

___ Provide FAX Results

Requested Report Date _____

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORHTWEST OTHER: _____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

MRL AT 0.05µg/L OR LOWER IS REQUESTED
THIS IS FOR STARKIST SAMCHA (SKS) - REPORT
SEPARATELY FROM CHICKEN OF THE SEA (COS)
ADDITIONAL INFORMATION SENT TO HARVEY JACKY
VIA EMAIL

RELINQUISHED BY:

SA Costa
Signature
SL COSTA
Printed Name
Date/Time
CH2M HILL
Firm

RECEIVED BY:

Tracy Hark
Signature
Hark
Printed Name
Date/Time
9/3/01 1570
Firm

RELINQUISHED BY:

Signature _____ Date/Time _____
Printed Name _____ Firm _____

RECEIVED BY:

Signature _____ Date/Time _____
Printed Name _____ Firm _____

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

October 17, 2005

Service Request No: K0503686

Steve Costa
CH2M Hill
216 Driftwood Lane
P.O. Box 1238
Trinidad, CA 95570-1238

RE: Joint Cannery Outfall/147323.JC.05.PR-SKS

Dear Steve:

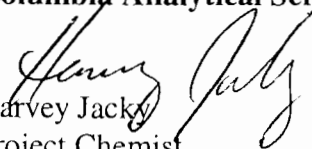
Enclosed are the results of the sample(s) submitted to our laboratory on September 7, 2005. For your reference, these analyses have been assigned our service request number K0503686.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260.


Respectfully submitted,

Columbia Analytical Services, Inc.



Harvey Jacky
Project Chemist

HJ/jeb

Page 1 of 

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M Hill	Service Request No.:	K0503686
Project:	Joint Cannery Outfall / 147323.JC.05.PR-SKS	Date Received:	9/7/05
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 9/7/05. The following discrepancies were noted upon initial sample inspection. The temperatures of the shipping coolers were above the upper recommended limit of 6 °C. The exceptions are also noted on the cooler receipt and preservation form included in this data package. Except as noted, the samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples were observed.

Approved by HS Date 10/10/05

00015

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
Sample Matrix: Water

Service Request: K0503686
Date Collected:
Date Received: 9/7/05

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0503686-001	5.0	0.5	5	10/12/05	10/13/05	73.4	
SKS-2	K0503686-002	5.0	0.5	5	10/12/05	10/13/05	109	
SKS-3	K0503686-003	5.0	0.5	5	10/12/05	10/13/05	101	
SKS-4	K0503686-004	5.0	0.5	5	10/12/05	10/13/05	122	
SKS-5	K0503686-005	5.0	0.5	5	10/12/05	10/13/05	117	
SKS-6	K0503686-006	5.0	0.5	5	10/12/05	10/13/05	153	
SKS-7	K0503686-007	5.0	0.5	5	10/12/05	10/13/05	112	
SKS-8	K0503686-008	5.0	0.5	5	10/12/05	10/13/05	91.2	
Method Blank 1	K0503686-MB1	1.0	0.1	1	10/12/05	10/13/05	ND	
Method Blank 2	K0503686-MB2	1.0	0.1	1	10/12/05	10/13/05	ND	
Method Blank 3	K0503686-MB3	1.0	0.1	1	10/12/05	10/13/05	ND	

00011

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
Sample Matrix: Water

Service Request: K0503686
Date Collected: NA
Date Received: NA
Date Extracted: 10/12/05
Date Analyzed: 10/13/05

Matrix Spike/Duplicate Matrix Spike Summary
 Total Metals

Sample Name: Batch QC
Lab Code: K0503565-002S, K0503565-002DS
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level		Sample Result	Spike Result		Percent Recovery		CAS Acceptance Limits	Relative Percent Difference	Result Notes
				MS	DMS		MS	DMS	MS	DMS			
Mercury	METHOD	1631E	1.0	25.0	25.0	5.9	34.5	33.6	114	111	71-125	3	

00012

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
LCS Matrix: Water

Service Request: K0503686
Date Collected: NA
Date Received: NA
Date Extracted: 10/12/05
Date Analyzed: 10/13/05

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.07	101	77-123	

00013

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
LCS Matrix: Water

Service Request: K0503686
Date Collected: NA
Date Received: NA
Date Extracted: 10/12/05
Date Analyzed: 10/13/05

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.14	103	77-123	

00014

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Outfall/147323.JC.05.PR-SKS
LCS Matrix: Water

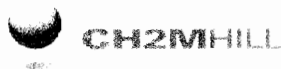
Service Request: K0503686
Date Collected: NA
Date Received: NA
Date Extracted: 10/12/05
Date Analyzed: 10/13/05

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample
Lab Code:
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.03	101	77-123	



Steve Costa	216 Driftwood Lane	707-677-0123 (Tel)
Karen Glatzel	P.O. Box 1238	707-677-9210 (Fax)
	Trinidad, CA 95570-1238	510-508-5020 (Cell)

2 April 2007

Mr. Carl Goldstein
Pacific Insular Area Programs
CMD-1
Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Mr. Peter Peshut
American Samoa Environmental
Protection Agency
American Samoa Government
P.O. Box 368A
Pago Pago, American Samoa 96799

Enclosed is the report for the 2006-tradewind period effluent mercury, copper, and zinc results for StarKist Samoa. The samples were taken concurrently with the November 2006 effluent toxicity sampling for the Joint Cannery Outfall in American Samoa. The sampling and analysis were carried out without problems. The primary results were:

- The results for mercury are similar to those from the August 2005 and March 2006 sampling, and indicate that a mixing zone for mercury will be required and can be established well within the ZID.
- The results for copper were similar to the March 2006 sampling but lower than generally found over the permit period, and well below the permit limitations. The results indicate the established and approved mixing zone is necessary and adequately defined.
- The results for zinc were similar to the March 2006 sampling but somewhat lower than those generally found over the permit period, and well below the permit limitations. The results indicate the established and approved mixing zone is necessary and adequately defined.

Please call us if you have any questions or comments on the enclosed report.

Sincerely,

Karen A. Glatzel
Steven L. Costa

cc: Brett Butler, StarKist Samoa; Joe Carney, StarKist Samoa; Tim Ruby, Del Monte;
David Wilson, CH2M HILL.

Encl: Effluent Metals Testing – StarKist Samoa, November 2006 Sampling

TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING – STARKIST SAMOA NOVEMBER 2006 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS00000019)

Prepared By: Steve Costa
Karen Glatzel

Date: 2 April 2007

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

Purpose

In November 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone based on recent changes in the American Samoa Water Quality Standards (ASWQS). Previous mercury sampling has been conducted for informational purposes. The results of this effluent mercury analysis will be included in the mercury database for establishing a mercury zone of mixing (ZOM).

The existing SKS NPDES Permit and renewal application has a permitted ZOM for both copper and zinc. Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The

¹ Submitted to USEPA in July 2005.

results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

Approach and Methods

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 7 November 2006 and 06:00 on 9 November 2006, samples of final effluent were collected from the SKS effluent discharge. Samples were collected from the established effluent sampling site. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. At the same times eight grab samples were collected into laboratory supplied, pre-cleaned, 1 liter plastic bottles at each cannery (for copper and zinc ICP analysis). Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected, laboratory supplied bottles (for mercury analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1, 2, and 3, for mercury, copper, and zinc, respectively. The laboratory data report is provided in Attachment 2.

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS November 2006 samples (0.158 µg/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 µg/l) and similar to the averages of supplemental mercury testing conducted in previous analyses.
- There was little variability among the results from individual grab samples (standard deviation = 0.03 µg/l) as shown in Table 1.
- All of the samples were above the recently revised ASWQS water quality standard criteria of 0.05 µg/l, and all values are below the USEPA National Recommended Water Quality Criteria (0.94 µg/l). The current NPDES Permit does not have a limitation for mercury.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports

³ Conducted in September 2004.

- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS November 2006 samples was 3.25 µg/l (Table 2).
- There was little variability among the copper results from the eight individual grab samples with the standard deviation (0.64 µg/l) at about 20% of the mean with a range between 2.28 µg/l and 4.32 µg/l (Table 2).
- Five of the eight copper samples were above the ASWQS criterion⁴ of 3.1 µg/l, although three samples were only slightly above the criterion. The values are well below the current NPDES Permit limitation for copper (monthly average of 66 µg/l, and daily maximum of 108 µg/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

The results of the sample testing for zinc indicate:

- The average zinc concentration for the SKS November 2006 samples was 276 µg/l (Table 3).
- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 61.7) with a range between 195 µg/l and 368 µg/l (Table 3).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 µg/l. All values are well below the current NPDES Permit limitation (1545 µg/l monthly average and 1770 µg/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

Discussion

Each of the metals under consideration has been previously measured in the effluent above the ASWQS criteria. A ZOM for mercury will be required in the renewal NPDES permit. The existing ZOMs for copper and zinc will need to be retained in the renewal NPDES permit. Table 4 provides the calculations necessary to show that ASWQS will be achieved within the zone of initial dilution.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

Mercury: Based on the available data a mixing zone will be required for mercury to comply with the recent revisions to the ASWQS (0.05 µg/l). The highest value recorded from the SKS November 2006 sampling was 0.158 µg/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge, during the Harbor Water Quality Monitoring studies was 0.0232 µg/l.

The dilution required to reduce the effluent concentration to the ASWQS is 5.0:1 (Table 4). Such a dilution is well within the zone of initial dilution (ZID) and occurs within two meters of the discharge based on previous dilution modeling done for the outfall diffuser.

Copper: A mixing zone for copper already exists in the NPDES Permit. A check of the dilution required for copper to comply with the ASWQS (3.1 µg/l) is calculated below (Table 4). The highest value of copper recorded from the SKS November 2006 sampling was 4.32 µg/l. The maximum recorded receiving water copper concentration within Pago Pago Harbor, in the vicinity of the discharge, was 0.83 µg/l.⁶

The dilution required to reduce the effluent concentration to the ASWQS is 1.5:1. This dilution is well within the zone of initial dilution (ZID) and occurs within one meter of the diffuser based on previous dilution modeling done for the outfall diffuser.

Zinc: A mixing zone already exists for zinc and is documented in the NPDES Permit. The dilution calculations for zinc to comply with the ASWQS (81 µg/l) are provided below (Table 4). The highest value recorded from the SKS November 2006 sampling was 368 µg/l. The maximum recorded receiving water zinc concentration within Pago Pago Harbor, in the vicinity of the discharge was 5.5 µg/l.⁷

The dilution required to reduce the effluent concentration to the ASWQS is 4.8:1. This dilution is well within the zone of initial dilution (ZID) and occurs within about two meters of the diffuser based on previous dilution modeling done for the outfall diffuser.

⁶ This value for copper is the highest receiving water concentration measured, during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

⁷ This value for zinc is the highest receiving water concentration measured during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

Table 1 SKS Effluent Flows and Mercury Concentrations 7 – 8 November 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations (µg/l)
1	7 November 2006 09:00	2.03	0.080
2	12:00	2.12	0.082
3	15:00	2.22	0.150
4	18:00	2.76	0.140
5	21:00	2.59	0.106
6	24:00	2.40	0.104
7	8 November 2006 03:00	2.41	0.158
8	06:00	2.60	0.115
Minimum		2.03	0.080
Average		2.35	0.113
Maximum		2.76	0.158
Standard Deviation		0.254	0.030

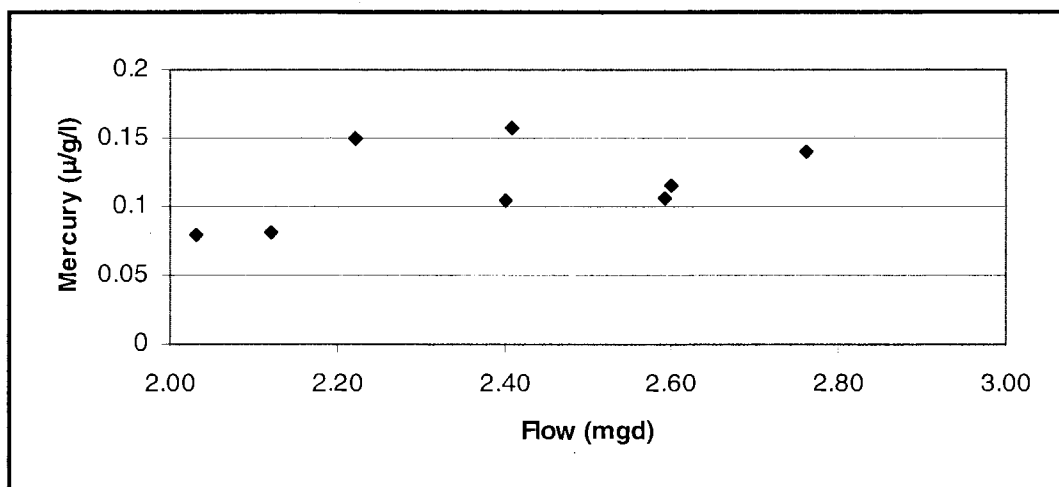


Figure 1.
Scatter plot of SKS effluent flow rate and mercury concentration (Nov 2006)

Table 2 SKS Effluent Flows and Copper Concentrations 7 – 8 November 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Copper Concentrations (µg/l)
1	7 November 2006 09:00	2.03	2.92
2	12:00	2.12	3.93
3	15:00	2.22	4.32
4	18:00	2.76	3.30
5	21:00	2.59	3.14
6	24:00	2.40	2.79
7	8 November 2006 03:00	2.41	3.35
8	06:00	2.60	2.28
Minimum		2.03	2.28
Average		2.35	3.25
Maximum		2.76	4.32
Standard Deviation		0.254	0.64

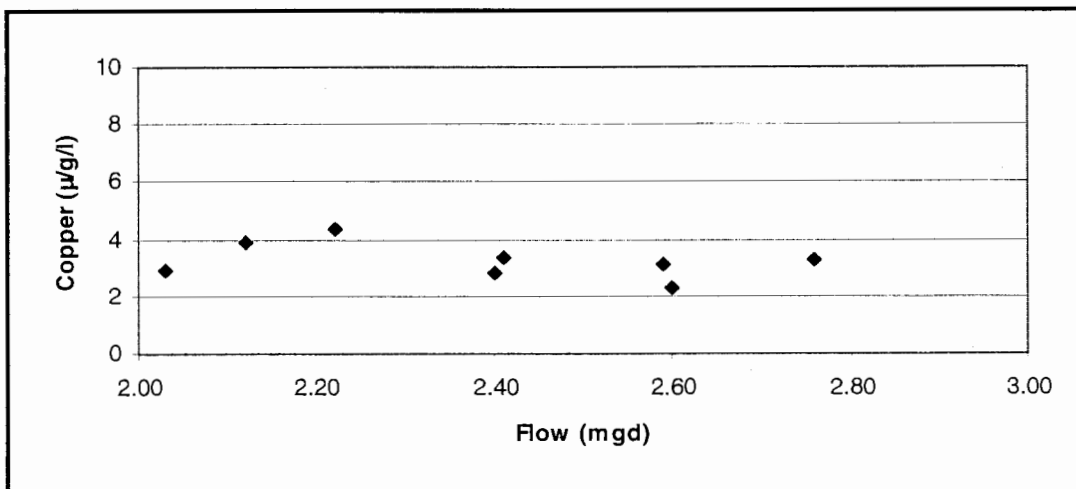


Figure 2.
Scatter plot of SKS effluent flow rate and copper concentration (Nov 2006)

Table 3 SKS Effluent Flows and Zinc Concentrations 7 – 8 November 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Zinc Concentrations (µg/l)
1	7 November 2006 09:00	2.03	200
2	12:00	2.12	272
3	15:00	2.22	368
4	18:00	2.76	322
5	21:00	2.59	329
6	24:00	2.40	246
7	8 November 2006 03:00	2.41	278
8	06:00	2.60	195
Minimum		2.03	195
Average		2.35	276
Maximum		2.76	368
Standard Deviation		0.254	61.7

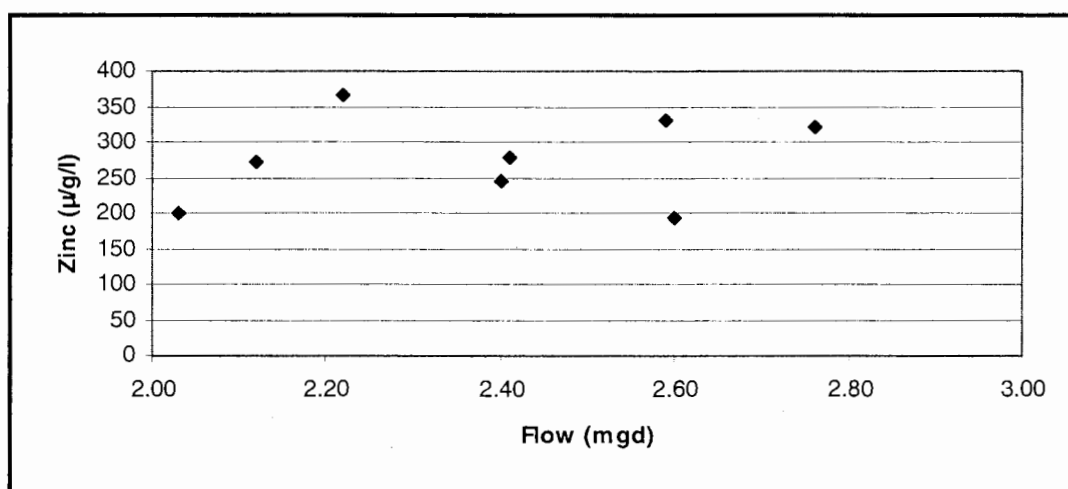


Figure 3.
Scatter plot of SKS effluent flow rate and zinc concentration (Nov 2006)

Table 4. Calculations of Required Dilution	
Calculation of Required Dilution for Mercury	
D_R = dilution required to meet ASWQS C_E = effluent concentration C_A = receiving water ambient concentration = 0.0232 µg/l C_S = ASWQS = 0.05 µg/l	
<p>For $C_E = 0.158$ µg/l:</p> $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.158 - 0.0232}{0.05 - 0.0232} = 5.03$	
Calculation of Required Dilution for Copper	
D_R = dilution required to meet ASWQS C_E = effluent concentration C_A = receiving water ambient concentration = 0.83 µg/l C_S = ASWQS = 3.1 µg/l	
<p>For $C_E = 4.32$ µg/l:</p> $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{4.32 - 0.83}{3.1 - 0.83} = 1.54$	
Calculation of Required Dilution for Zinc	
D_R = dilution required to meet ASWQS C_E = effluent concentration C_A = receiving water ambient concentration = 5.5 µg/l C_S = ASWQS = 81 µg/l	
<p>For $C_E = 368$ µg/l:</p> $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{368 - 5.5}{81 - 5.5} = 4.80$	

ATTACHMENT I

Chain-of-Custody



CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE 1 OF 1 COC # 80610033

PROJECT NAME <u>STARKIST SANDA EFFLUENT MONITORING</u>				
PROJECT NUMBER <u>147323.JC.CO.TW</u>				
PROJECT MANAGER <u>STEVE COSTA</u>				
COMPANY ADDRESS <u>CH2M HILL</u>				
<u>PO BOX 1238</u>				
CITY/STATE/ZIP <u>TRINIDAD, CA 95570</u>				
E-MAIL ADDRESS <u>SCOSTA@CH2M.COM</u>				
PHONE # <u>707-677-0123</u> FAX <u>707-677-9210</u>				
SAMPLER SIGNATURE <u>[Signature]</u>				
SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX
SKS-1	7-8 Nov 2006		H2O	2
SKS-2				2
SKS-3				2
SKS-4				2
SKS-5				2
SKS-6				2
SKS-7				2
SKS-8				2

REPORT REQUIREMENTS <input type="checkbox"/> I. Routine Report: Method Blank, Surrogate, as required <input checked="" type="checkbox"/> II. Report Dup., MS, MSD as required <input type="checkbox"/> III. Data Validation Report (includes all raw data) <input type="checkbox"/> IV. CLP Deliverable Report <input type="checkbox"/> V. EDD	INVOICE INFORMATION P.O. # _____ Bill To: _____ TURNAROUND REQUIREMENTS ____ 24 hr. ____ 48 hr. ____ 5 Day ____ Standard (10-15 working days) ____ Provide FAX Results Requested Report Date _____	CIRCLE which metals are to be analyzed: Total Metals: Al As Sb Ba Be B Ca Cd Co Cr <u>Cu</u> Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V <u>Zn</u> <u>Hg</u> Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg *INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: _____ (CIRCLE ONE) SPECIAL INSTRUCTIONS/COMMENTS: <u>SAMPLES MAY BE 75-90% SEAWATER</u> <u>DHL AIRBILL 782-0788-426</u>
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RELINQUISHED BY: <u>[Signature]</u> <u>9/11/06</u> Signature Date/Time <u>COSTA</u> <u>CH2M HILL</u> Printed Name Firm	RECEIVED BY: <u>[Signature]</u> <u>11/16/06</u> Signature Date/Time <u>Juell</u> Printed Name Firm	RELINQUISHED BY: Signature Date/Time Printed Name Firm	RECEIVED BY: Signature Date/Time Printed Name Firm
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ATTACHMENT II

Columbia Analytical Systems Laboratory Report

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M Hill	Service Request No.:	K0610033
Project:	Starkist Samoa Effluent Monitoring/147323.JC.06.TW		
Date Received:	11/15/06	Sample Matrix:	Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 11/15/06. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples were observed.

Approved by _____ Date 12/14/06

00006

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
Sample Matrix: Water

Service Request: K0610033
Date Collected: 11/7/06
Date Received: 11/15/06

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0610033-001	5.0	0.35	5	11/15/06	12/11/06	80.2	
SKS-2	K0610033-002	5.0	0.35	5	11/15/06	12/11/06	82.0	
SKS-3	K0610033-003	5.0	0.35	5	11/15/06	12/11/06	150	
SKS-4	K0610033-004	5.0	0.35	5	11/15/06	12/11/06	140	
SKS-5	K0610033-005	5.0	0.35	5	11/15/06	12/11/06	106	
SKS-6	K0610033-006	5.0	0.35	5	11/15/06	12/11/06	104	
SKS-7	K0610033-007	5.0	0.35	5	11/15/06	12/11/06	158	
SKS-8	K0610033-008	5.0	0.35	5	11/15/06	12/11/06	115	
Method Blank 1	K0610033-MB1	1.0	0.07	1	11/30/06	12/11/06	ND	
Method Blank 2	K0610033-MB2	1.0	0.07	1	11/15/06	12/11/06	ND	
Method Blank 3	K0610033-MB3	1.0	0.07	1	11/15/06	12/11/06	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
Sample Matrix: Water

Service Request: K0610033
Date Collected: 11/7/06
Date Received: 11/15/06
Date Extracted: 11/15/06
Date Analyzed: 12/11/06

Matrix Spike/Duplicate Matrix Spike Summary
 Total Metals

Sample Name: SKS-3 Units: ng/L
Lab Code: K0610033-003S, K0610033-003SD Basis: NA
Test Notes:

Analyte	Prep Method	Analysis Method	MRL	Spike Level			Sample		Spike Result		MS	DMS	Percent Recovery		CAS Acceptance Limits	Relative Percent Difference	Result. Notes
				MS	DMS	Result	MS	DMS	MS	DMS			MS	DMS			
Mercury	METHOD	1631E	5.0	250	250	150	354	351	82	80			71-125			<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
LCS Matrix: Water

Service Request: K0610033
Date Collected: NA
Date Received: NA
Date Extracted: 11/15/06
Date Analyzed: 12/11/06

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.16	83	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
LCS Matrix: Water

Service Request: K0610033
Date Collected: NA
Date Received: NA
Date Extracted: 11/15/06
Date Analyzed: 12/11/06

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final) **Units:** ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.24	85	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
LCS Matrix: Water

Service Request: K0610033
Date Collected: NA
Date Received: NA
Date Extracted: 11/15/06
Date Analyzed: 12/11/06

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.22	84	77-123	

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0610033-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.92		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	200		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0610033-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.93		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	272		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0610033-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	4.32		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	368		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0610033-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.30		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	322		

% Solids: 0.0

Comments:

METALS
-1-
INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill Service Request: K0610033
Project No.: 147323.JC.06.TW Date Collected: 11/07/06
Project Name: Starkist Samoa Effluent Monitoring Date Received: 11/15/06
Matrix: WATER Units: µG/L
Basis: NA

Sample Name: SKS-5

Lab Code: K0610033-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.14		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	329		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0610033-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.79		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	246		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µg/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0610033-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.35		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	278		

% Solids: 0.0

Comments:

00045

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0610033-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.28		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	195		

% Solids: 0.0

Comments:

00046

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected:

Project Name: Starkist Samoa Effluent Monitoring

Date Received:

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0610033-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	0.01	B	
Zinc	200.8	1.00	0.04	1	11/21/06	11/22/06	0.06	B	

% Solids: 0.0

Comments:

00047

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper	12.5	12.4	99	25.0	25.2	101	24.5	98	200.8
Zinc	25.0	24.7	99	25.0	25.1	100	24.9	100	200.8

00048

Columbia Analytical Services

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	25.0	100	25.3	101	200.8
Zinc				25.0	24.9	100	25.1	100	200.8

00049

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	25.7	103			200.8
Zinc				25.0	25.5	102			200.8

Columbia Analytical Services

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	Initial	Final			
Copper				1.0	1.03	103		
Zinc				5.0	5.17	103		

Columbia Analytical Services

METALS

- 3 -

BLANKS

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		Method
		C	1	C	2	C	3	C	C		
Copper	0.05	U	0.05	U	0.05	U	0.05	U			200.8
Zinc	0.20	U	0.20	U	0.20	U	0.20	U			200.8

Columbia Analytical Services

METALS

-3-

BLANKS

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	Continuing Calibration Blank (ug/L)						Preparation Blank C	Method
		C	1	C	2	C	3	C	
Copper			0.05	U	0.05	U			200.8
Zinc			0.20	U	0.20	U			200.8

TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING – STARKIST SAMOA MARCH 2006 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa
Karen Glatzel

Date: 24 April 2006

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

Purpose

In March 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered high rate diffuser in approximately 176 feet of water. The SKS NPDES Permit renewal application¹ indicated that mercury will require a zone of mixing (ZOM) based on recent changes in the American Samoa Water Quality Standards (ASWQS). Previous mercury sampling has been conducted for informational purposes. The results of this effluent mercury analysis will be included in the mercury database for establishing a ZOM for mercury.

The existing SKS NPDES Permit and renewal application has a permitted ZOM for both copper and zinc. Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data are reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The

¹ Submitted to USEPA in July 2005.

TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING – STARKIST SAMOA MARCH 2006 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa
Karen Glatzel

Date: 24 April 2006

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

Purpose

In March 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered high rate diffuser in approximately 176 feet of water. The SKS NPDES Permit renewal application¹ indicated that mercury will require a zone of mixing (ZOM) based on recent changes in the American Samoa Water Quality Standards (ASWQS). Previous mercury sampling has been conducted for informational purposes. The results of this effluent mercury analysis will be included in the mercury database for establishing a ZOM for mercury.

The existing SKS NPDES Permit and renewal application has a permitted ZOM for both copper and zinc. Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data are reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The

¹ Submitted to USEPA in July 2005.

results reported here are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

Approach and Methods

Sampling and sample handling methods followed the standard operating procedures (SOPs) that were previously developed and approved by the USEPA and the American Samoa Environmental Protection Agency (ASEPA) for cannery effluent sampling. Between 09:00 on 28 February 2006 and 06:00 on 01 March 2006, samples of final effluent were collected from the StarKist Samoa effluent discharge. Samples were collected from the established effluent sampling site. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers at each cannery. Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected, laboratory supplied mercury and ICP metals (for copper and zinc) sample bottles were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1, 2, and 3, for mercury, copper, and zinc, respectively. The laboratory data report is provided in Attachment 2.

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS March 2006 samples (0.126 µg/l; Table 1) is less than half the value reported in the priority pollutant scan³ (0.27 µg/l) and close to the average of supplemental mercury testing conducted in August 2005 (0.117 µg/l).
- There was some variability among the results from individual grab samples (standard deviation = 0.072 µg/l), primarily because of one value of 0.298 µg/l that is approximately three times higher than other values (Table 1).
- All of the samples were above the recently revised ASWQS water quality standard criterion of 0.05 µg/l, and all values are below the USEPA National Recommended Water Quality Criteria (0.94 µg/l). The current NPDES Permit does not have a limitation for mercury.

² Results of the SKS metals analyses and the bioassay testing are presented in separate Technical Memorandums.

³ Conducted in September 2004.

- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS March 2006 samples was 3.120 µg/l (Table 2).
- There was noticeable variability among the results from the eight individual copper grab samples (standard deviation = 0.996 µg/l) with a range between 1.79 µg/l and 4.83 µg/l (Table 2).
- Four out of eight copper samples were below the ASWQS criterion⁴ of 3.1 µg/l, three copper samples were measured near 3.6 µg/l. One sample (Grab 8) was measured at 4.830 µg/l, still well below the NPDES permit limitation.
- There appears to be no significant relationship between the flow rate and the effluent copper concentration as shown in Figure 2.

The results of the sample testing for zinc indicate:

- The average zinc concentration for the March 2006 samples was 237 µg/l (Table 3).
- There was a noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 60) with a range between 146 µg/l and 340 µg/l (Table 3).
- All of the eight zinc samples were above the ASWQS criterion⁵ of 81 µg/l. All values were well below the current NPDES Permit limitation.
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

Discussion

Each of the metals under consideration has been previously measured in the effluent above the ASWQS criteria. A ZOM for mercury will be required in the renewal NPDES permit. The existing ZOMs for copper and zinc will need to be retained in the renewal NPDES permit. Table 4 provides the calculations necessary to show ASWQS will be achieved within the zone of initial dilution.

Mercury: Based on the available data a mixing zone will be required for mercury to comply with the recent revisions to the ASWQS (0.05 µg/l). The highest value recorded from the March 2006 sampling was 0.298 µg/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge; during the Harbor Water Quality Monitoring studies was 0.0232 µg/l.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

The dilution required to reduce the effluent concentration to the ASWQS is less than 10.3:1. Such a dilution is well within the zone of initial dilution (ZID) and occurs within a few meters of the discharge based on previous dilution modeling done for the outfall diffuser.

Copper: A mixing zone for copper already exists in the NPDES Permit. A check of the dilution required for copper to comply with the ASWQS (3.1 µg/l) is calculated below. The highest value of copper recorded from the March 2006 sampling was 4.830 µg/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge was 0.83 µg/l⁶.

The dilution required to reduce the effluent concentration to the ASWQS is less than 1.8:1. This dilution is well within the zone of initial dilution (ZID) and occurs within a meter of the diffuser based on previous dilution modeling done for the outfall diffuser.

Zinc: A mixing zone already exists for zinc and is documented in the NPDES Permit. The dilution calculations for zinc to comply with the ASWQS (81 µg/l), are provided below. The highest value recorded from the March 2006 sampling was 340 µg/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge; during the Harbor Water Quality Monitoring studies was 5.5 µg/l⁷.

The dilution required to reduce the effluent concentration to the ASWQS is less than 4.4:1. This dilution is well within the zone of initial dilution (ZID) and occurs within two meters of the diffuser based on previous dilution modeling done for the outfall diffuser.

⁶ This value for copper is the highest receiving water concentration measured, during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

⁷ This value for zinc is the highest receiving water concentration measured excluding outliers greater than three standard deviations from the mean.

Table 1 StarKist Samoa Effluent Flows and Mercury Concentrations 28 February - 1 March 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations ($\mu\text{g/l}$)
1	28 Feb 2006 09:00	1.98	0.107
2	12:00	2.63	0.083
3	15:00	2.60	0.298
4	18:00	1.94	0.088
5	21:00	1.95	0.096
6	24:00	2.16	0.092
7	1 March 2006 03:00	2.53	0.102
8	06:00	2.15	0.145
Minimum		1.94	0.083
Average		2.24	0.126
Maximum		2.63	0.298
Standard Deviation		0.30	0.072

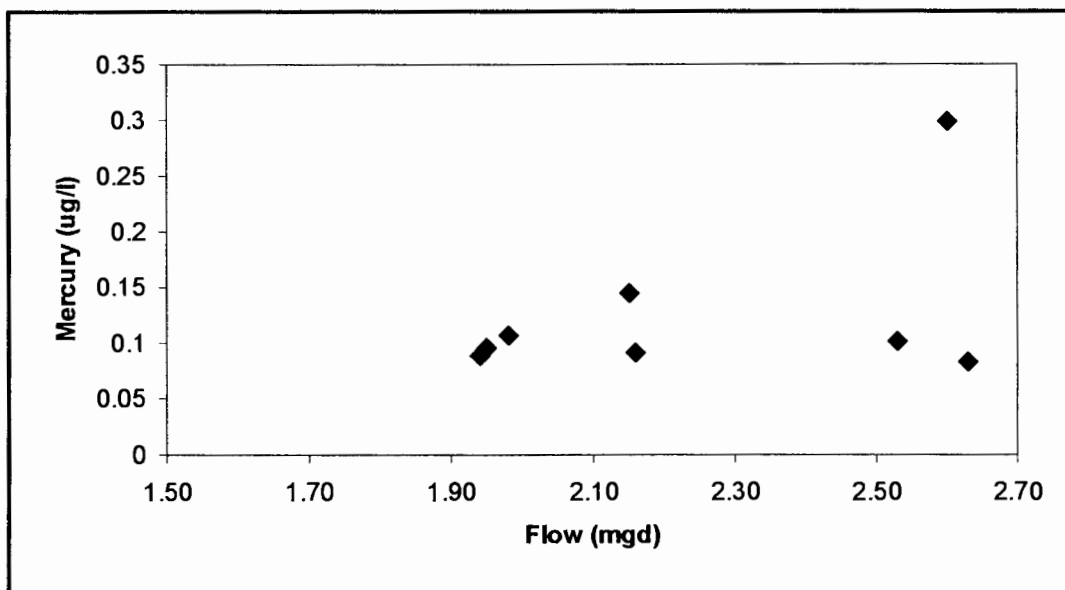


Figure 1.
Scatter plot of StarKist Samoa effluent flow rate and mercury concentration

Table 2 StarKist Samoa Effluent Flows and Copper Concentrations 28 February - 1 March 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Copper Concentrations ($\mu\text{g/l}$)
1	28 Feb 2006 09:00	1.98	3.630
2	12:00	2.63	2.820
3	15:00	2.60	2.170
4	18:00	1.94	3.610
5	21:00	1.95	3.670
6	24:00	2.16	2.440
7	1 March 2006 03:00	2.53	1.790
8	06:00	2.15	4.830
Minimum		1.94	1.790
Average		2.24	3.120
Maximum		2.63	4.830
Standard Deviation		0.30	0.996

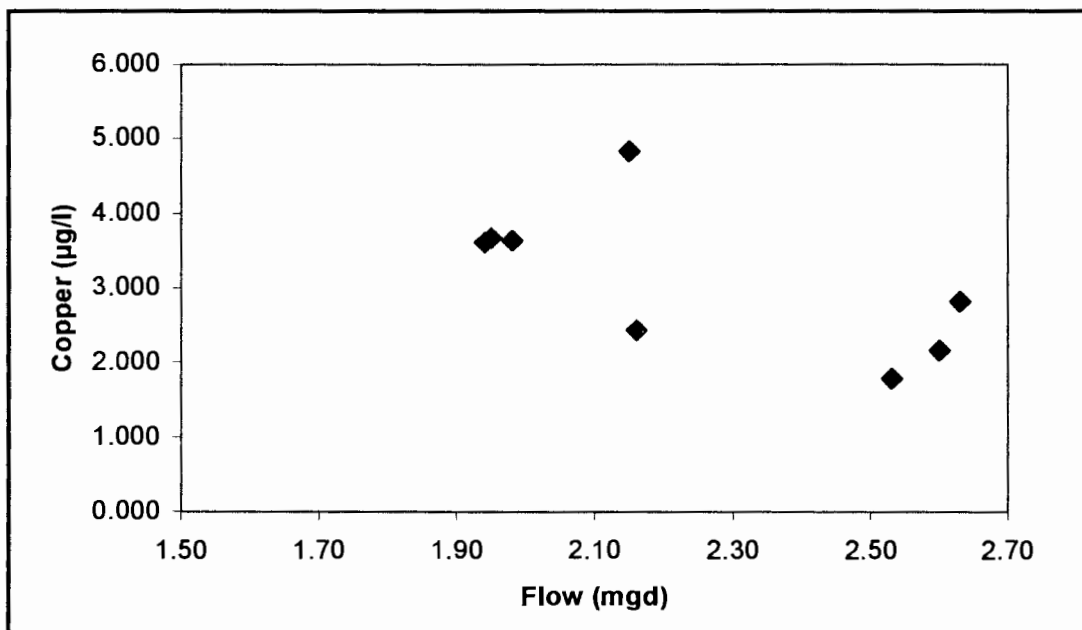


Figure 2.
Scatter plot of StarKist Samoa effluent flow rate and copper concentration

Table 3 StarKist Samoa Effluent Flows and Zinc Concentrations 28 February - 1 March 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Zinc Concentrations (µg/l)
1	28 Feb 2006 09:00	1.98	264
2	12:00	2.63	196
3	15:00	2.60	146
4	18:00	1.94	226
5	21:00	1.95	340
6	24:00	2.16	267
7	1 March 2006 03:00	2.53	190
8	06:00	2.15	266
Minimum		1.94	146
Average		2.24	237
Maximum		2.63	340
Standard Deviation		0.30	60

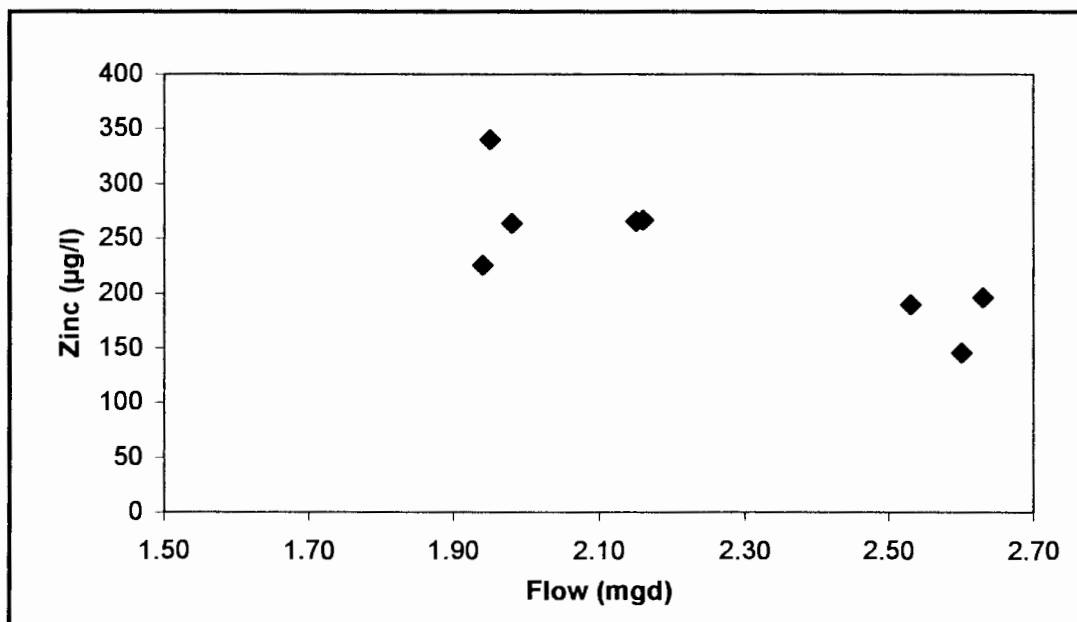
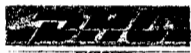


Figure 3.
Scatter plot of StarKist Samoa effluent flow rate and zinc concentration

Table 4. Calculations of Required Dilution	
Calculation of Required Dilution for Mercury	
D _R = dilution required to meet ASWQS C _E = effluent concentration C _A = receiving water ambient concentration = 0.0232 µg/l C _S = proposed ASWQS = 0.05 µg/l	
For C _E = 0.298 µg/l: $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.298 - 0.0232}{0.05 - 0.0232} = 10.3$	
Calculation of Required Dilution for Copper	
D _R = dilution required to meet ASWQS C _E = effluent concentration C _A = receiving water ambient concentration = 0.83 µg/l C _S = ASWQS = 3.1 µg/l	
For C _E = 4.830 µg/l: $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{4.830 - 0.83}{3.1 - 0.83} = 1.8$	
Calculation of Required Dilution for Zinc	
D _R = dilution required to meet ASWQS C _E = effluent concentration C _A = receiving water ambient concentration = 5.5 µg/l C _S = ASWQS = 81 µg/l	
For C _E = 340 µg/l: $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{340 - 5.5}{81 - 5.5} = 4.4$	

ATTACHMENT I

Chain-of-Custody



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DESTINATION CODE

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1 Payer account number and shipment value protection details

Charge to ☐ Shipper ☐ Receiver ☒ 3rd Party ☐ Cash ☐ Check ☐ Credit Card

Payer Account No. 920701629

Shipment Value Protection (see reverse)

☐ Yes Declared Value for Carriage (in US \$) _____

Not all payment options are available in all countries.

2 From (Shipper)

Shipper's Account Number 920701629 Contact Name JOE CARNEY

Shipper's Reference (up to 35 characters) 147323.JQ.06.NT

Company Name STARKIST SAMOA

Address PAGO PAGO
AMERICAN SAMOA

Post/ZIP Code (required) 96799 Phone, Fax, or E-mail (required) 808-644-4231

3 To (Receiver)

Company Name COLUMBIA ANALYTICAL SERVICES

Contact Name HARVEY JACKY

Delivery Address DHL Cannot Deliver to a PO Box 1317 SOUTH 13TH AVE
KELSO, WA

Country USA

Post/ZIP Code (required) 98626 Phone, Fax, or E-mail (required) 360-577-7222



4 Shipment Details

Total Number of Packages 8 Total Weight 395 Dimensions (in inches) 8 x 23 x 14 x 13

Pieces Length Width Height

Net Weight 395 lbs

5 Full Description of Contents

Give Content and Quantity. DHL Does Not Transport Cash

WATER QUALITY SAMPLES FOR
LABORATORY ANALYSIS
NO COMMERCIAL VALUE

6 Dutiable Shipments Only (Customs requirement)

Attach the original and four copies of a Commercial Invoice or Pro Forma. Export License No./Symbol (if applicable) Receiver's VAT/GST or Shipper's EIN/SSN

Value for Customs (in US \$) B 400 Schedule B Number / Harmonized Code (if applicable)

TYPE OF EXPORT ☐ Permanent ☐ Repair/Return ☐ Temporary

Destination Duties/Taxes If left blank, Receiver pays duties/taxes.

☒ Receiver ☐ Shipper ☐ Other 920701629

The commodities, technology or software to be exported from the U.S. are in compliance with the U.S. Bureau of Export Administration. Diversion to countries contrary to U.S. law prohibited.

7 Shipper's Authorization (signature required)

I/we agree that DHL's standard terms apply to this shipment and limit DHL's liability for loss or damage to U.S. \$100. The Warsaw Convention may also apply (see reverse). I/we authorize DHL to complete other documents necessary to export this shipment. I/we understand that Shipment Value Protection is available on request for an extra charge. I/we agree to pay all charges if the recipient or 3rd party refuses to pay. I/we understand that DHL DOES NOT TRANSPORT CASH.

Signature (required) Joe Carney Date 3/2/06

8 Products & Services

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☐ Saturday Delivery ☐ Special Pickup ☐ Hold For Pickup ☐ Delivery Notification

Not all products or service options are available to/from all locations.

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lbs

SERVICES	CHARGES
Drop Box #	TOTAL

TRANSPORT COLLECT STICKER NO.

PAYMENT DETAILS (Check, Card No.)

No.:

Type Expires

Auth.

PICKED UP BY

Route No. 1256

Time 4:45 Date 3/2

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CHAIN OF CUSTODY

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PAGE 1 OF 2 SR#: K0601763 COC # _____

PROJECT NAME: JOINT CANNERY EFFLUENT MONITORING					NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625 <input type="checkbox"/> 8270 <input type="checkbox"/> 8270LL <input type="checkbox"/> Volatile Organics 624 <input type="checkbox"/> 8260 <input type="checkbox"/> Hydrocarbons (see below) Gas <input type="checkbox"/> 8021 <input type="checkbox"/> BTEX <input type="checkbox"/> <input type="checkbox"/> Fuel Fingerprint <input type="checkbox"/> Oil <input type="checkbox"/> <input type="checkbox"/> NW-HCID Screen <input type="checkbox"/> Oil & Grease/TPH <input type="checkbox"/> 1664 HEM <input type="checkbox"/> 1664 SGT <input type="checkbox"/> PCB's <input type="checkbox"/> Aroclors <input type="checkbox"/> Congeners <input type="checkbox"/> 608 <input type="checkbox"/> 8081A <input type="checkbox"/> 8141A <input type="checkbox"/> 8151A <input type="checkbox"/> Chlorophenolics - 8151M <input type="checkbox"/> Tri <input type="checkbox"/> Tetra <input type="checkbox"/> PCP <input type="checkbox"/> PAHS 8310 <input type="checkbox"/> SIM <input type="checkbox"/> Metals, Total or Dissolved (See list below) Cyanide <input type="checkbox"/> Hex-Chrom <input type="checkbox"/> pH, Cond, Cl, SO ₄ , PO ₄ , F, NO ₂ , NO ₃ , BOD, TSS, TDS (circle) NH ₃ -N, COD, Total-P, TKN, TOC, DOC (circle) NO ₂ +NO ₃ TOX 9020 <input type="checkbox"/> AOX 1650 <input type="checkbox"/> 506 <input type="checkbox"/>
PROJECT NUMBER: 147323.JC.06.NT						
PROJECT MANAGER: STEVE COSTA						
COMPANY ADDRESS: CH2M HILL						
CITY/STATE/ZIP: P.O. BOX 1238						
E-MAIL ADDRESS: TRINIDAD, CA 96570						
PHONE: SCOSTA@CH2M.COM						
FAX: 707-677-0123						
SAMPLER'S SIGNATURE: 707-677-9210						
SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX		
SKS-1	3/1/06			H ₂ O	2	
SKS-2					2	
SKS-3					2	
SKS-4					2	
SKS-5					2	
SKS-6					2	
SKS-7					2	
SKS-8					2	

REMARKS

000

REPORT REQUIREMENTS I. Routine Report: Method Blank, Surrogate, as required <input checked="" type="checkbox"/> II. Report Dup., MS, MSD as required III. Data Validation Report (includes all raw data) IV. CLP Deliverable Report V. EDD		INVOICE INFORMATION P.O. # _____ Bill To: _____ TURNAROUND REQUIREMENTS 24 hr. _____ 48 hr. _____ 5 Day _____ Standard (10-15 working days) _____ Provide FAX Results _____ Requested Report Date _____		Circle which metals are to be analyzed: Total Metals: Al As Sb Ba Be B Ca Cd Co Cr <u>Cu</u> Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V <u>Zn</u> <u>Hg</u> Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Ti Sn V Zn Hg *INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: _____ (CIRCLE ONE)	
		SPECIAL INSTRUCTIONS/COMMENTS: *PLEASE PROVIDE SEPARATE REPORTS FOR SKS-# AND COS-# SAMPLES *SKS-# SAMPLES MAY BE 40% SEAWATER SHIP DHL WAYBILL 782-0788-415			
RELINQUISHED BY: Signature: <u>Steve Costa</u> Date/Time: <u>2 MAR 06</u> Printed Name: <u>STEVE COSTA</u> Firm: <u>CH2M HILL</u>		RECEIVED BY: Signature: <u>Tracy Black</u> Date/Time: <u>3/6/06 1100</u> Printed Name: <u>Tracy Black</u> Firm: <u>CH2M HILL</u>		RELINQUISHED BY: Signature: _____ Date/Time: _____ Printed Name: _____ Firm: _____	
		RECEIVED BY: Signature: _____ Date/Time: _____ Printed Name: _____ Firm: _____			

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

March 16, 2006

Service Request No: K0601753

Steve Costa
CH2M Hill
216 Driftwood Lane
P.O. Box 1238
Trinidad, CA 95570-1238

RE: Joint Cannery Effluent Monitoring/147323.JC.06.NT

Dear Steve:

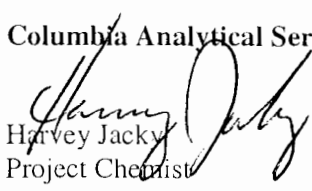
Enclosed are the results of the sample(s) submitted to our laboratory on March 06, 2006. For your reference, these analyses have been assigned our service request number K0601753.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAC standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260.

Respectfully submitted,

Columbia Analytical Services, Inc.


Harvey Jacky
Project Chemist

HJ/jm

Page 1 of 99

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client: CH2M Hill Service Request No.: K0601753
Project: Joint Cannery Effluent Monitoring / 147323.JC.06.NT
Date Received: 3/6/06 Sample Matrix: Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory; Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 3/6/06. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.


Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

Approved by _____

Date

 3/20/06

00005

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
Sample Matrix: Water

Service Request: K0601753
Date Collected: 3/1/06
Date Received: 3/6/06

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0601753-001	5.0	0.5	5	3/7/06	3/13/06	107	
SKS-2	K0601753-002	5.0	0.5	5	3/7/06	3/13/06	82.6	
SKS-3	K0601753-003	5.0	0.5	5	3/7/06	3/13/06	298	
SKS-4	K0601753-004	5.0	0.5	5	3/7/06	3/13/06	87.5	
SKS-5	K0601753-005	5.0	0.5	5	3/7/06	3/13/06	95.9	
SKS-6	K0601753-006	5.0	0.5	5	3/7/06	3/13/06	92.3	
SKS-7	K0601753-007	5.0	0.5	5	3/7/06	3/13/06	102	
SKS-8	K0601753-008	5.0	0.5	5	3/7/06	3/13/06	145	
Method Blank 1	K0601753-MB1	1.0	0.1	1	3/7/06	3/13/06	ND	
Method Blank 2	K0601753-MB2	1.0	0.1	1	3/7/06	3/13/06	ND	
Method Blank 3	K0601753-MB3	1.0	0.1	1	3/7/06	3/13/06	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
Sample Matrix: Water

Service Request: K0601753
Date Collected: NA
Date Received: NA
Date Extracted: 3/7/06
Date Analyzed: 3/13/06

Matrix Spike/Duplicate Matrix Spike Summary
 Total Metals

Sample Name: Batch QC
Lab Code: K0601634-001S, K0601634-001SD
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Percent Recovery									Relative Percent Difference	Result Notes
				Spike Level		Sample Result	Spike Result		CAS Acceptance Limits					
				MS	DMS		MS	DMS	MS	DMS				
Mercury	METHOD	1631E	1.0	25	25	17.4	46.4	44.6	116	109	71-125	4		

00011

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
LCS Matrix: Water

Service Request: K0601753
Date Collected: NA
Date Received: NA
Date Extracted: 3/7/06
Date Analyzed: 3/13/06

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.35	107	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
LCS Matrix: Water

Service Request: K0601753
Date Collected: NA
Date Received: NA
Date Extracted: 3/7/06
Date Analyzed: 3/13/06

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.45	109	77-123	

00013

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Joint Cannery Effluent Monitoring/147323.JC.06.NT
LCS Matrix: Water

Service Request: K0601753
Date Collected: NA
Date Received: NA
Date Extracted: 3/7/06
Date Analyzed: 3/13/06

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample
Lab Code: K0601753-QCS
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.30	106	77-123	

00014

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0601753-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.630		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	264		

* Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0601753-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.820		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	196		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0601753-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.170		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	146		

% Solids: 0.0

Comments:

00038

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0601753-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.610		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	226		

% Solids: 0.0

Comments:

00039

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0601753-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	3.670		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	340		

% Solids: 0.0

Comments:

00040

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0601753-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	2.440		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	267		

% Solids: 0.0

Comments:

00041

METALS
-1-
INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill Service Request: K0601753
Project No.: 147323.JC.06.NT Date Collected: 03/01/06
Project Name: Joint Cannery Effluent Monitoring Date Received: 03/06/06
Matrix: WATER Units: µg/L
Basis: NA

Sample Name: SKS-7

Lab Code: K0601753-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	1.790		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	190		

% Solids: 0.0

Comments:

METALS
-1-
INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected: 03/01/06

Project Name: Joint Cannery Effluent Monitoring

Date Received: 03/06/06

Matrix: WATER

Units: µg/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0601753-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	1.000	0.050	10	3/10/06	3/14/06	4.830		
Zinc	200.8	5.00	0.20	10	3/10/06	3/14/06	266		

% Solids: 0.0

Comments:

METALS
-1-
INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Date Collected:

Project Name: Joint Cannery Effluent Monitoring

Date Received:

Matrix: WATER

Units: µg/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0601753-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.100	0.005	1	3/10/06	3/14/06	0.005	U	
Zinc	200.8	0.50	0.02	1	3/10/06	3/14/06	0.02	B	

% Solids: 0.0

Comments:

00044

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/l

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper	12.5	12.4	99	25.0	25.7	103	25.0	100	200.8
Zinc	25.0	25.1	100	25.0	25.3	101	24.8	99	200.8

00045

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

ICV Source:

CCV Source: Various

Concentration Units: ug/l

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	25.1	100			200.8
Zinc				25.0	24.9	100			200.8

00046

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit.

Concentration Units: ug/l

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	Initial True	Initial Found	Initial %R	Final Found	Final %R
Copper				1.0	1.01	101		
Zinc				5.0	4.57	91		

METALS

-3-

BLANKS

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank			Method
		C	1	C	2	C	3	C	C			
Copper	0.050	U	0.050	U	0.05	U	0.050	U				200.8
Zinc	0.20	U	0.20	U	0.20	U	0.20	U				200.8

00048

METALS

-7-

LABORATORY CONTROL SAMPLE

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

Analyte	Aqueous ug/L			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Copper	2.00	1.94	97					
Zinc	2.00	1.92	96					

METALS

-7-

LABORATORY CONTROL SAMPLE

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

Analyte	Aqueous ug/L			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits	%R	
Copper	2.00	2.00	100						
Zinc	2.00	1.94	97						

METALS

-10-

METHOD DETECTION LIMITS

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

ICP/ICP-MS ID #: Excell ICPMS

GFAA ID #:

AA ID #:

Analyte	Mass	Back-ground	MRL (ug/L)	MDL (ug/L)	Method
Copper	65		1.000	0.050	200.8
Zinc	66		5.00	0.20	200.8

Comments

00051

METALS

-12-

ICP LINEAR RANGES (QUARTERLY)

Client: CH2M Hill

Service Request: K0601753

Project No.: 147323.JC.06.NT

Project Name: Joint Cannery Effluent Monit

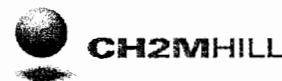
ICP ID Number: Excell ICPMS

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Copper	15.00	500.0	200.8
Zinc	15.00	500.0	200.8

Comments: _____

00052

TECHNICAL MEMORANDUM



EFFLUENT METALS TESTING – STARKIST SAMOA NOVEMBER 2006 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS00000019)

Prepared By: Steve Costa
Karen Glatzel

Date: 2 April 2007

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

Purpose

In November 2006 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent collected before it enters the Joint Cannery Outfall (JCO), which is shared with Chicken of the Sea Samoa Packing (COS). Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone based on recent changes in the American Samoa Water Quality Standards (ASWQS). Previous mercury sampling has been conducted for informational purposes. The results of this effluent mercury analysis will be included in the mercury database for establishing a mercury zone of mixing (ZOM).

The existing SKS NPDES Permit and renewal application has a permitted ZOM for both copper and zinc. Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The

¹ Submitted to USEPA in July 2005.

results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

Approach and Methods

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 7 November 2006 and 06:00 on 9 November 2006, samples of final effluent were collected from the SKS effluent discharge. Samples were collected from the established effluent sampling site. Detailed sampling procedures are described in the established SOP for cannery effluent sampling.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. At the same times eight grab samples were collected into laboratory supplied, pre-cleaned, 1 liter plastic bottles at each cannery (for copper and zinc ICP analysis). Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period. After all samples were collected, laboratory supplied bottles (for mercury analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

Results

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1, 2, and 3, for mercury, copper, and zinc, respectively. The laboratory data report is provided in Attachment 2.

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS November 2006 samples (0.158 µg/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 µg/l) and similar to the averages of supplemental mercury testing conducted in previous analyses.
- There was little variability among the results from individual grab samples (standard deviation = 0.03 µg/l) as shown in Table 1.
- All of the samples were above the recently revised ASWQS water quality standard criteria of 0.05 µg/l, and all values are below the USEPA National Recommended Water Quality Criteria (0.94 µg/l). The current NPDES Permit does not have a limitation for mercury.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports

³ Conducted in September 2004.

- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS November 2006 samples was 3.25 µg/l (Table 2).
- There was little variability among the copper results from the eight individual grab samples with the standard deviation (0.64 µg/l) at about 20% of the mean with a range between 2.28 µg/l and 4.32 µg/l (Table 2).
- Five of the eight copper samples were above the ASWQS criterion⁴ of 3.1 µg/l, although three samples were only slightly above the criterion. The values are well below the current NPDES Permit limitation for copper (monthly average of 66 µg/l, and daily maximum of 108 µg/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

The results of the sample testing for zinc indicate:

- The average zinc concentration for the SKS November 2006 samples was 276 µg/l (Table 3).
- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 61.7) with a range between 195 µg/l and 368 µg/l (Table 3).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 µg/l. All values are well below the current NPDES Permit limitation (1545 µg/l monthly average and 1770 µg/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

Discussion

Each of the metals under consideration has been previously measured in the effluent above the ASWQS criteria. A ZOM for mercury will be required in the renewal NPDES permit. The existing ZOMs for copper and zinc will need to be retained in the renewal NPDES permit. Table 4 provides the calculations necessary to show that ASWQS will be achieved within the zone of initial dilution.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

Mercury: Based on the available data a mixing zone will be required for mercury to comply with the recent revisions to the ASWQS (0.05 µg/l). The highest value recorded from the SKS November 2006 sampling was 0.158 µg/l. The maximum recorded receiving water mercury concentration within Pago Pago Harbor, in the vicinity of the discharge, during the Harbor Water Quality Monitoring studies was 0.0232 µg/l.

The dilution required to reduce the effluent concentration to the ASWQS is 5.0:1 (Table 4). Such a dilution is well within the zone of initial dilution (ZID) and occurs within two meters of the discharge based on previous dilution modeling done for the outfall diffuser.

Copper: A mixing zone for copper already exists in the NPDES Permit. A check of the dilution required for copper to comply with the ASWQS (3.1 µg/l) is calculated below (Table 4). The highest value of copper recorded from the SKS November 2006 sampling was 4.32 µg/l. The maximum recorded receiving water copper concentration within Pago Pago Harbor, in the vicinity of the discharge, was 0.83 µg/l.⁶

The dilution required to reduce the effluent concentration to the ASWQS is 1.5:1. This dilution is well within the zone of initial dilution (ZID) and occurs within one meter of the diffuser based on previous dilution modeling done for the outfall diffuser.

Zinc: A mixing zone already exists for zinc and is documented in the NPDES Permit. The dilution calculations for zinc to comply with the ASWQS (81 µg/l) are provided below (Table 4). The highest value recorded from the SKS November 2006 sampling was 368µg/l. The maximum recorded receiving water zinc concentration within Pago Pago Harbor, in the vicinity of the discharge was 5.5 µg/l.⁷

The dilution required to reduce the effluent concentration to the ASWQS is 4.8:1. This dilution is well within the zone of initial dilution (ZID) and occurs within about two meters of the diffuser based on previous dilution modeling done for the outfall diffuser.

⁶ This value for copper is the highest receiving water concentration measured, during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

⁷ This value for zinc is the highest receiving water concentration measured during the NPDES Permit required Pago Pago Harbor Water Quality Monitoring Program, excluding outliers greater than three standard deviations from the mean.

Table 1 SKS Effluent Flows and Mercury Concentrations 7 – 8 November 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Mercury Concentrations (µg/l)
1	7 November 2006 09:00	2.03	0.080
2	12:00	2.12	0.082
3	15:00	2.22	0.150
4	18:00	2.76	0.140
5	21:00	2.59	0.106
6	24:00	2.40	0.104
7	8 November 2006 03:00	2.41	0.158
8	06:00	2.60	0.115
Minimum		2.03	0.080
Average		2.35	0.113
Maximum		2.76	0.158
Standard Deviation		0.254	0.030

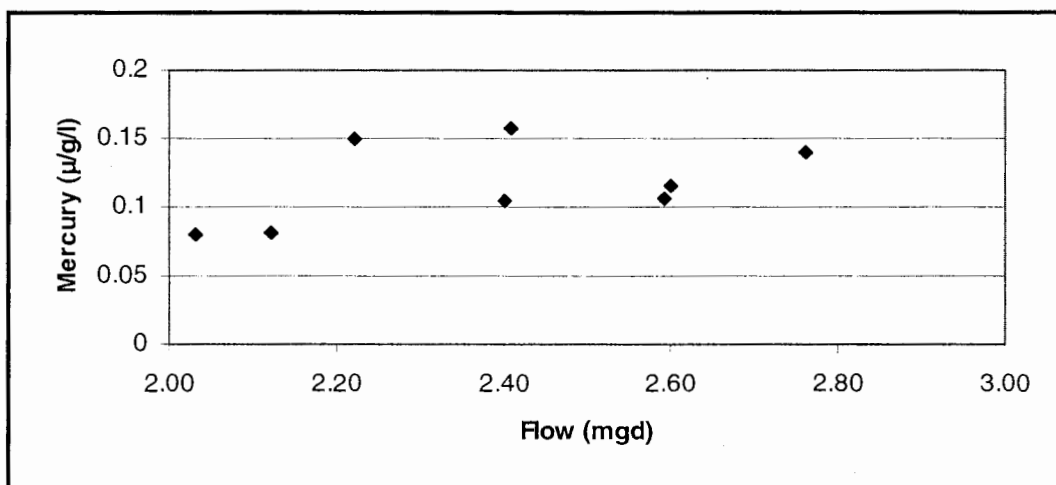


Figure 1.
Scatter plot of SKS effluent flow rate and mercury concentration (Nov 2006)

Table 2 SKS Effluent Flows and Copper Concentrations 7 – 8 November 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Copper Concentrations ($\mu\text{g/l}$)
1	7 November 2006 09:00	2.03	2.92
2	12:00	2.12	3.93
3	15:00	2.22	4.32
4	18:00	2.76	3.30
5	21:00	2.59	3.14
6	24:00	2.40	2.79
7	8 November 2006 03:00	2.41	3.35
8	06:00	2.60	2.28
Minimum		2.03	2.28
Average		2.35	3.25
Maximum		2.76	4.32
Standard Deviation		0.254	0.64

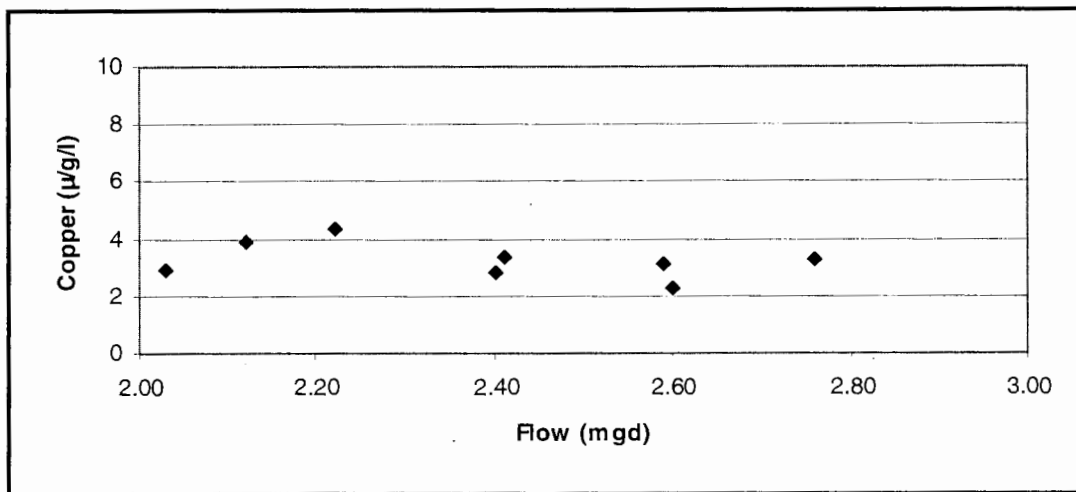


Figure 2.
Scatter plot of SKS effluent flow rate and copper concentration (Nov 2006)

Table 3 SKS Effluent Flows and Zinc Concentrations 7 – 8 November 2006			
Grab Sample Number	Sampling Date and Time	Effluent Flow Rate (mgd)	Zinc Concentrations (µg/l)
1	7 November 2006 09:00	2.03	200
2	12:00	2.12	272
3	15:00	2.22	368
4	18:00	2.76	322
5	21:00	2.59	329
6	24:00	2.40	246
7	8 November 2006 03:00	2.41	278
8	06:00	2.60	195
Minimum		2.03	195
Average		2.35	276
Maximum		2.76	368
Standard Deviation		0.254	61.7

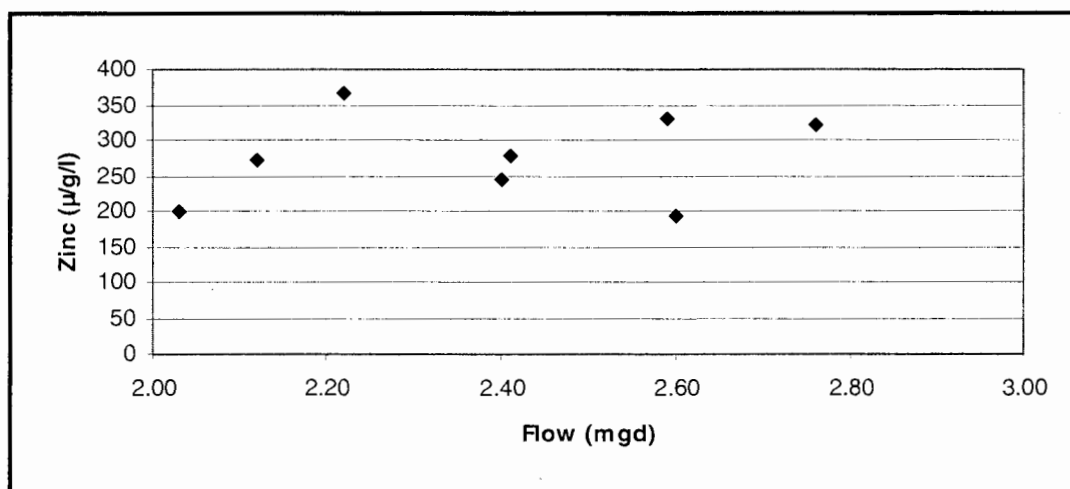
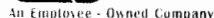


Figure 3.
Scatter plot of SKS effluent flow rate and zinc concentration (Nov 2006)

Table 4. Calculations of Required Dilution	
Calculation of Required Dilution for Mercury	
D _R = dilution required to meet ASWQS C _E = effluent concentration C _A = receiving water ambient concentration = 0.0232 µg/l C _S = ASWQS = 0.05 µg/l	
For C _E = 0.158 µg/l: $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{0.158 - 0.0232}{0.05 - 0.0232} = 5.03$	
Calculation of Required Dilution for Copper	
D _R = dilution required to meet ASWQS C _E = effluent concentration C _A = receiving water ambient concentration = 0.83 µg/l C _S = ASWQS = 3.1 µg/l	
For C _E = 4.32 µg/l: $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{4.32 - 0.83}{3.1 - 0.83} = 1.54$	
Calculation of Required Dilution for Zinc	
D _R = dilution required to meet ASWQS C _E = effluent concentration C _A = receiving water ambient concentration = 5.5 µg/l C _S = ASWQS = 81 µg/l	
For C _E = 368 µg/l: $D_R = \frac{C_E - C_A}{C_S - C_A} = \frac{368 - 5.5}{81 - 5.5} = 4.80$	

ATTACHMENT I

Chain-of-Custody



SR#

COC.#

08

SR#

COC.#

8

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BOCC #1 06/02

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M Hill	Service Request No.:	K0610033
Project:	Starkist Samoa Effluent Monitoring/147323.JC.06.TW		
Date Received:	11/15/06	Sample Matrix:	Water

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 11/15/06. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples were observed.

Approved by _____ Date 12/14/06

00006

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
Sample Matrix: Water

Service Request: K0610033
Date Collected: 11/7/06
Date Received: 11/15/06

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0610033-001	5.0	0.35	5	11/15/06	12/11/06	80.2	
SKS-2	K0610033-002	5.0	0.35	5	11/15/06	12/11/06	82.0	
SKS-3	K0610033-003	5.0	0.35	5	11/15/06	12/11/06	150	
SKS-4	K0610033-004	5.0	0.35	5	11/15/06	12/11/06	140	
SKS-5	K0610033-005	5.0	0.35	5	11/15/06	12/11/06	106	
SKS-6	K0610033-006	5.0	0.35	5	11/15/06	12/11/06	104	
SKS-7	K0610033-007	5.0	0.35	5	11/15/06	12/11/06	158	
SKS-8	K0610033-008	5.0	0.35	5	11/15/06	12/11/06	115	
Method Blank 1	K0610033-MB1	1.0	0.07	1	11/30/06	12/11/06	ND	
Method Blank 2	K0610033-MB2	1.0	0.07	1	11/15/06	12/11/06	ND	
Method Blank 3	K0610033-MB3	1.0	0.07	1	11/15/06	12/11/06	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
Sample Matrix: Water

Service Request: K0610033
Date Collected: 11/7/06
Date Received: 11/15/06
Date Extracted: 11/15/06
Date Analyzed: 12/11/06

Matrix Spike/Duplicate Matrix Spike Summary
 Total Metals

Sample Name: SKS-3 Units: ng/L
Lab Code: K0610033-003S, K0610033-003SD Basis: NA
Test Notes:

Analyte	Prep Method	Analysis Method	MRL	Spike Level		Sample Result	Spike Result		Percent Recovery		CAS Acceptance Limits	Relative Percent Difference	Result Notes
				MS	DMS		MS	DMS	MS	DMS			
Mercury	METHOD	1631E	5.0	250	250	150	354	351	82	80	71-125	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
LCS Matrix: Water

Service Request: K0610033
Date Collected: NA
Date Received: NA
Date Extracted: 11/15/06
Date Analyzed: 12/11/06

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.16	83	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
LCS Matrix: Water

Service Request: K0610033
Date Collected: NA
Date Received: NA
Date Extracted: 11/15/06
Date Analyzed: 12/11/06

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.24	85	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Starkist Samoa Effluent Monitoring/147323.JC.06.TW
LCS Matrix: Water

Service Request: K0610033
Date Collected: NA
Date Received: NA
Date Extracted: 11/15/06
Date Analyzed: 12/11/06

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.22	84	77-123	

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0610033-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.92		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	200		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0610033-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.93		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	272		

* Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0610033-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	4.32		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	368		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0610033-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.30		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	322		

* Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0610033-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.14		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	329		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0610033-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.79		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	246		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0610033-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	3.35		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	278		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected: 11/07/06

Project Name: Starkist Samoa Effluent Monitoring

Date Received: 11/15/06

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0610033-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	2.28		
Zinc	200.8	20.00	0.80	20	11/21/06	11/22/06	195		

% Solids: 0.0

Comments:

00046

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Date Collected:

Project Name: Starkist Samoa Effluent Monitoring

Date Received:

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0610033-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.01	1	11/21/06	11/22/06	0.01	B	
Zinc	200.8	1.00	0.04	1	11/21/06	11/22/06	0.06	B	

% Solids: 0.0

Comments:

00047

Columbia Analytical Services

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper	12.5	12.4	99	25.0	25.2	101	24.5	98	200.8
Zinc	25.0	24.7	99	25.0	25.1	100	24.9	100	200.8

00048

Columbia Analytical Services

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	25.0	100	25.3	101	200.8
Zinc				25.0	24.9	100	25.1	100	200.8

00049

Columbia Analytical Services

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	25.7	103			200.8
Zinc				25.0	25.5	102			200.8

Columbia Analytical Services

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	Initial	Final			
	True	Found	%R	True	Found	%R	Found	%R
Copper				1.0	1.03	103		
Zinc				5.0	5.17	103		

Columbia Analytical Services

METALS

-3-

BLANKS

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		Method
	C		1	C	2	C	3	C	C		
Copper	0.05	U	0.05	U	0.05	U	0.05	U			200.8
Zinc	0.20	U	0.20	U	0.20	U	0.20	U			200.8

Columbia Analytical Services

METALS

- 3 -

BLANKS

Client: CH2M Hill

Service Request: K0610033

Project No.: 147323.JC.06.TW

Project Name: Starkist Samoa Effluent Moni

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		Method
	C		1	C	2	C	3	C	C		
Copper			0.05	U	0.05	U					200.8
Zinc			0.20	U	0.20	U					200.8

TECHNICAL MEMORANDUM

gdc

EFFLUENT METALS TESTING – STARKIST SAMOA SEPTEMBER 2007 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa
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Date: 21 December 2007

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

SUMMARY

The NPDES permit for StarKist Samoa includes effluent limitations for copper and zinc. The renewal permit will also include an effluent limitation for mercury. All three metals are discharged into an approved mixing zone. Semi-annual effluent monitoring for all three metals is currently required. The analysis for the 2007 tradewind season was done using eight (8) samples. A sample was collected every three hours for a 24 hr period September 4th and 5th, 2007. The results are summarized as follows:

	Flow (mg/d)	Hg (µg/l)	Cu (µg/l)	Zn (µg/l)
Minimum	1.17	0.0152	0.89	107
Average	1.26	0.0580	1.86	194
Maximum	1.39	0.1220	3.13	298
Water Quality Criterion		0.0500	3.10	81.0
Required Dilution		3.69	1.01	3.87

Copper was below the American Samoa Water Quality Standards criterion for all samples, except one, where it is equal to the standard. Mercury exceeded the ASWQS criterion for four of the eight samples, and zinc exceeded the criterion for all eight samples. Using background concentrations based on receiving water monitoring the dilutions required to meet the ASWQS criteria were two orders of magnitude lower than the predicted critical initial dilution. Therefore, compliance with the ASWQS is demonstrated well within the zone of initial dilution and the approved mixing zones.

INTRODUCTION

In September 2007 metals analyses were conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent. The samples were collected before the SKS effluent enters the Joint Cannery Outfall (JCO) shared with Chicken of the Sea Samoa Packing (COS). Both SKS and COS process tuna and, after high strength waste segregation, the treated process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water.

The existing SKS NPDES permit and renewal application has a permitted zone of mixing (ZOM) for both copper and zinc. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone. Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined effluent discharge. Each effluent grab sample was analyzed for mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Formerly, SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period, beginning in January 2006, the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

APPROACH AND METHODS

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 4 September and 06:00 on 5 September 2007, samples of final effluent were collected from the SKS effluent discharge at the established effluent sampling site.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. Samples were collected at approximately three-hour intervals over the 24-hour period. A total of eight grab samples were collected. A 1-gallon plastic cubitainer was filled at each sampling interval. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period.

After all samples were collected, laboratory supplied bottles (one for mercury analysis and one for copper and zinc analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

¹ Submitted to USEPA in July 2005.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports.

RESULTS AND DISCUSSION

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1. The laboratory data report is provided in Attachment 2.

Table 1. Results of Effluent Metals Testing – September 2007				
Time	Flow (mg/d)	Hg (µg/l)	Cu (µg/l)	Zn (µg/l)
4 Sept 2007 - 09:00	1.17	0.0614	2.90	290
4 Sept 2007 - 12:00	1.33	0.0168	3.13	298
4 Sept 2007 - 15:00	1.39	0.0152	1.91	227
4 Sept 2007 - 18:00	1.28	0.0490	0.89	107
4 Sept 2007 - 21:00	1.22	0.0630	1.94	232
5 Sept 2007 - 00:00	1.28	0.0502	0.94	130
5 Sept 2007 - 03:00	1.17	0.0866	1.54	135
5 Sept 2007 - 06:00	1.27	0.1220	1.63	132
Minimum	1.17	0.0152	0.89	107
Average	1.26	0.0580	1.86	194
Maximum	1.39	0.1220	3.13	298
Standard Deviation	0.076	0.0351	0.81	77.0

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS September 2007 samples (0.0580 µg/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 µg/l) and less than to the averages of supplemental mercury testing conducted in previous analyses summarized in the next section.
- There was noticeable, but relatively low, variability among the results from individual grab samples (standard deviation = 0.035 µg/l) as shown in Table 1.
- Four of the eight of the samples were above the recently revised ASWQS water quality standard criteria of 0.05 µg/l. One sample was equal to the criterion. The current NPDES Permit does not have a limitation for mercury.
- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS September 2007 samples was 1.86 µg/l (Table 1). The average concentrations reported for this sampling period are generally less than those reported for previous analyses as described in the next section, and similar to the value reported in February 2007.
- There was noticeable, but relatively low, variability among the copper results from the eight individual grab samples with a standard deviation of 0.81 µg/l.

³ Conducted in September 2004.

- All of the samples had copper concentrations below or equal to the ASWQS criterion⁴ of 3.1 µg/l (one sample was essentially the same as the criterion). The values are well below the current NPDES Permit limitation for copper (monthly average of 66 µg/l, and daily maximum of 108 µg/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

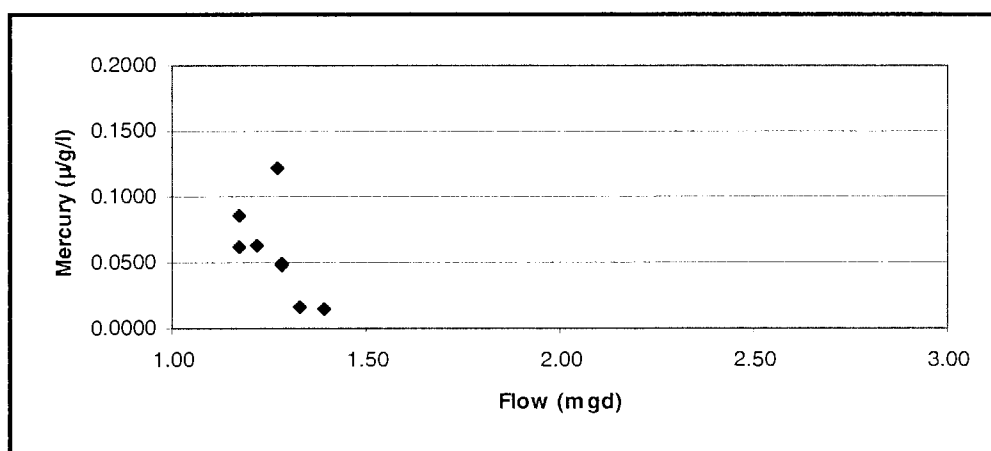


Figure 1. SKS effluent flow rate and mercury concentration (Sept 2007)

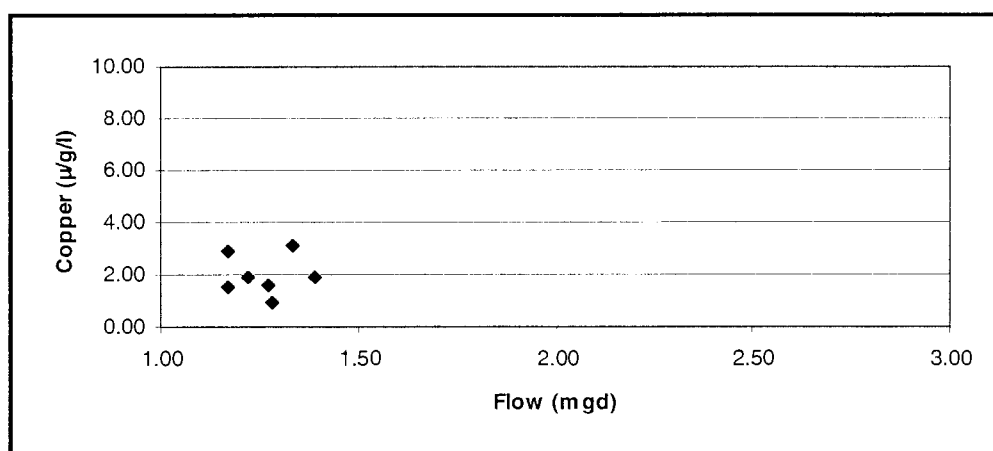


Figure 2. SKS effluent flow rate and copper concentration (Sept 2007)

The results of the sample testing for zinc indicate:

- The average zinc concentration for the SKS September 2007 samples was 194 µg/l (Table 1). This concentration is less than the average values for previous analyses described in the next section and about the same as the result for the February 2007 sampling.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 77.0) with a range between 107 µg/l and 298 µg/l (Table1).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 µg/l. All values are well below the current NPDES Permit limitation (1545 µg/l monthly average and 1770 µg/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

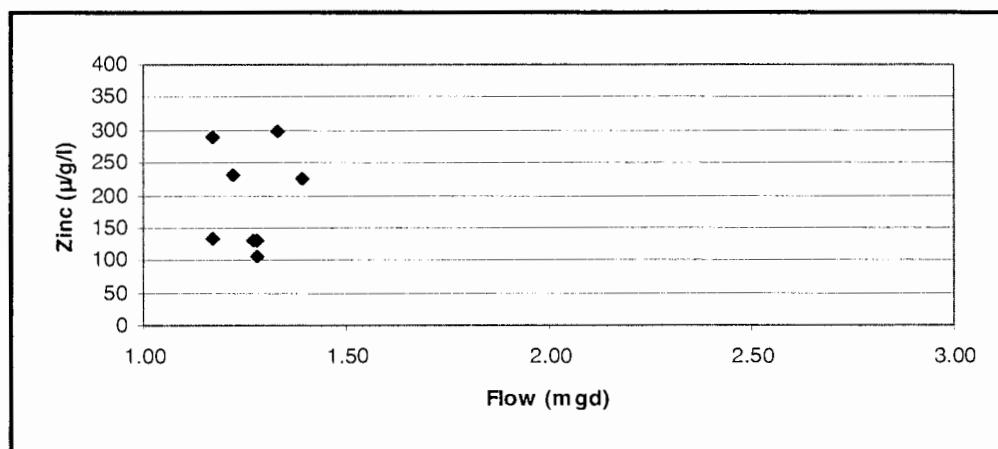


Figure 3. SKS effluent flow rate and zinc concentration (Sept 2007)

Comparison to Previous Tests

A summary of the semi-annual metals testing is presented in Table 2. Each of the metals under consideration has been measured in the effluent above the ASWQS criteria. Table 2 also provides the results of calculations necessary to show that ASWQS will be achieved within the zone of initial dilution (ZID). The required dilution is calculated using the following equation:

$$D_R = \frac{C_E - C_A}{C_S - C_A}$$

where

D_R = is the dilution required to reduce the concentration to the ASWQS

C_E = the effluent concentration

C_A = the maximum receiving water concentration

C_S = The ASWQS criterion

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

Table 2. Summary of Effluent Metals Testing Results and Dilution Required* to Meet ASWQS Criteria							
Parameter		Mercury		Copper		Zinc	
Water Quality Criterion		0.05 µg/l		3.1 µg/l		81 µg/l	
Ambient Maximum		0.0232 µg/l		0.83 µg/l		5.5 µg/l	
Sample Date	Flow (mgd)	Conc. (µg/l)	Dilution Required	Conc. (µg/l)	Dilution Required	Conc. (µg/l)	Dilution Required
Aug 2005	2.44	0.0734	1.87				
	3.05	0.109	3.20				
	3.02	0.101	2.90				
	2.39	0.122	3.69				
	2.55	0.177	5.74				
	2.8	0.153	4.84				
	2.03	0.112	3.31				
Feb 2006	2.14	0.0912	2.54				
	1.98	0.107	3.13	3.63	1.23	264	3.42
	2.63	0.083	2.23	2.82	1	196	2.52
	2.6	0.298	10.25	2.17	1	146	1.86
	1.94	0.088	2.42	3.61	1.22	226	2.92
	1.95	0.096	2.72	3.67	1.25	340	4.43
	2.16	0.092	2.57	2.44	1	267	3.46
Nov 2006	2.53	0.102	2.94	1.79	1	190	2.44
	2.15	0.145	4.54	4.83	1.76	266	3.45
	2.03	0.0802	2.13	2.92	1	200	2.58
	2.12	0.0820	2.19	3.93	1.37	272	3.53
	2.22	0.150	4.73	4.32	1.54	368	4.80
	2.76	0.140	4.36	3.3	1.09	322	4.19
	2.59	0.106	3.09	3.14	1.02	329	4.28
Feb 2007	2.40	0.104	3.01	2.79	1	246	3.19
	2.41	0.158	5.03	3.35	1.11	278	3.61
	2.60	0.115	3.43	2.28	1	195	2.51
	2.20	0.0550	1.19	1.56	1	169	2.17
	2.02	0.0586	1.32	2.31	1	296	3.85
	2.06	0.0676	1.66	2.02	1	178	2.28
	2.50	0.0501	1.00	1.43	1	142	1.81
Sep 2007	2.48	0.0704	1.76	2.16	1	196	2.52
	1.76	0.0427	1	1.81	1	166	2.13
	2.16	0.0825	2.21	2.98	1	222	2.87
	2.15	0.0810	2.16	2.13	1	159	2.03
	1.17	0.0614	1.43	2.90	1	290	3.77
	1.33	0.0168	1	3.13	1.01	298	3.87
	1.39	0.0152	1	1.91	1	227	2.93
Minimum	1.28	0.0490	1	0.89	1	107	1.34
	1.22	0.0630	1.49	1.94	1	232	3.00
	1.28	0.0502	1.01	0.94	1	130	1.65
	1.17	0.0866	2.37	1.54	1	135	1.72
	1.27	0.1220	3.69	1.63	1	132	1.68
	1.17	0.0152	1.00	0.89	1.00	107	1.34
	2.12	0.0964	2.80	2.57	1.08	225	2.90
Average	3.05	0.2980	10.25	4.83	1.76	368	4.80

*If the effluent concentration is equal to or less than the criterion, the dilution required is shown as 1.

*If the effluent concentration is equal to or less than the criterion, the dilution required is shown as 1.

Conclusions

Based on the available data a mixing zone will be required for each of the three metals considered. The required dilution (See Table 2) for all of the metals is substantially less than the critical initial dilution, which is over 300:1⁶. Therefore, compliance with the ASWQS criteria will be achieved well within the ZID. The highest dilution required was 10.3:1, which will be achieved within 2.7 meters of the discharge point, within three seconds after discharge, and about one meter above the discharge point (in a total water depth of about 53.6 meters).

⁶ See "Request for Water Quality Certification and the Definition of Mixing Zones". **gdc**, 28 June 2007

ATTACHMENT I

Chain-of-Custody

CHAIN OF CUSTODY

10708430

0008

PROJECT:	StarKist Effluent Monitoring - SKS0702.TW													
FROM:	Karen Glatzel, gdc													
	P.O. Box 1238, Trinidad, CA, 95570-1238						707-677-0123			gdcocn@earthlink.net				
TO:	Harvey Jacky, Columbia Analytical Services													
	1317 South 13th Ave, Kelso, WA 98626						360-577-7222							
SAMPLE I.D.	DATE	TIME	MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUESTED								COMMENTS	
					Total-P	NH3-N	NO3+NO2	TKN (AmTest)	Chlorophyll-a	Cu	Zn	Hg		
SKS-1	9/5/2007		Water	2							X	X	X	Total metals
SKS-2	9/5/2007		Water	2							X	X	X	
SKS-3	9/5/2007		Water	2							X	X	X	
SKS-4	9/5/2007		Water	2							X	X	X	
SKS-5	9/5/2007		Water	2							X	X	X	
SKS-6	9/5/2007		Water	2							X	X	X	
SKS-7	9/5/2007		Water	2							X	X	X	
SKS-8	9/5/2007		Water	2							X	X	X	
SAMPLED BY: K. Glatzel					DATE/TIME:	9/5/2007	SPECIAL INSTRUCTIONS/REMARKS: Note: Sample may be as much as 40% seawater Report Dup, MS, MSD as required							
SHIPPED VIA: DHL					DATE/TIME:	9/6/2007								
RELINQUISHED BY: S. Costa					DATE/TIME:	9/6/2007								
RECEIVED BY: <i>Harvey Jacky</i>					DATE/TIME:	9/13/07 1030								
RELINQUISHED BY:					DATE/TIME:									
RECEIVED BY:					DATE/TIME:									



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Shipment Value Protection (see reverse)
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Not all payment options are available in all countries.
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☐ Check
☐ Credit Card

2 From (Shipper)

Shipper's Account Number
918902636
Contact Name
JOE CARNEY
Shipper's Reference (up to 35 characters)
NPDES - RW - GDC (07-TW)
Company Name
STARKIST SAMOA
Address
PAGE PAUL
AMERICAN SAMOA
Post/ZIP Code (required)
96799
Phone, Fax, or E-mail (required)
644-644-4231

3 To (Receiver)

Company Name
COLUMBIA AERIAL SERVICES
Contact Name
HARVEY JACKY
Delivery Address DHL Cannot Deliver to a PO Box
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USA
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(as on Commercial/Pro Forma Invoice)

Schedule B Number / Harmonized Code (if applicable)

TYPE OF EXPORT ☐ Permanent ☐ Repair/Return ☐ Temporary

Destination Duties/Taxes If left blank, Receiver pays duties/taxes.

☐ Receiver ☒ Shipper ☐ Other

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ATTACHMENT II

Columbia Analytical Systems Laboratory Report

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Glatzel da Costa, gdc	Service Request No.:	K0708430
Project:	Starkist Effluent Monitoring / SKS0702.TW	Sample Matrix:	Water
Date Received:	09/18/07		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 09/18/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples for the reductive precipitation procedure. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

Approved by _____ *H* Date 10/31/07

0006

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-1 Lab Code: K0708430-001

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	2.90		
Zinc	200.8	21.4	1.71	20.0	10/02/07	10/04/07	290		

% Solids: 0.0

Comments:

0013

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-2 Lab Code: K0708430-002

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	3.13		
Zinc	200.8	21.7	1.74	20.0	10/02/07	10/04/07	298		

% Solids: 0.0

Comments:

0014

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-3 Lab Code: K0708430-003

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	1.91		
Zinc	200.8	21.5	1.72	20.0	10/02/07	10/04/07	227		

% Solids: 0.0

Comments:

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Date Collected: 9/5/07

Project Name: Starkist Effluent Monitoring

Date Received: 9/18/07

Matrix: WATER

Units: ug/L

Basis: N/A

Sample Name: SKS-4

Lab Code: K0708430-004

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	0.89		
Zinc	200.8	1.06	0.09	1.0	10/02/07	10/04/07	107		

```
% Solids:      0.0
```

Comments:

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-5 Lab Code: K0708430-005

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.06	1.0	10/02/07	10/04/07	1.94		
Zinc	200.8	21.4	1.71	20.0	10/02/07	10/04/07	232		

% Solids: 0.0

Comments:

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-6 Lab Code: K0708430-006

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.07	1.0	10/02/07	10/04/07	0.94		
Zinc	200.8	1.08	0.09	1.0	10/02/07	10/04/07	130		

% Solids: 0.0

Comments:

Columbia Analytical Services

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Glatzel da Costa, gdc Service Request: K0708430
Project No.: SKS0702.TW Date Collected: 9/5/07
Project Name: Starkist Effluent Monitoring Date Received: 9/18/07
Matrix: WATER Units: ug/L
Basis: N/A

Sample Name: SKS-7 Lab Code: K0708430-007

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.06	1.0	10/02/07	10/04/07	1.54		
Zinc	200.8	1.07	0.09	1.0	10/02/07	10/04/07	135		

% Solids: 0.0

Comments:

0019

Basis: N/A

Lab Code: K0708430-008

Comments:

Abstract

Service Request: K0708430

Date Collected:

Date Received:

Units: ug/L

Basis: N/A

Lab Code: K0708430-MB

Columbia Analytical Services

Metals

- 3 -

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Method
		C	1	C	2	C	3	C	
Copper	0.30	U	0.30	U	0.30	U	0.30	U	200.8
Zinc	0.4	U	0.4	U	0.4	U	0.4	U	200.8

Columbia Analytical Services

Metals

- 3 -

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Method
			1	C	2	C	3	C	
Copper			0.30	U	0.30	U	0.30	U	200.8
Zinc			0.4	U	0.4	U	0.4	U	200.8

Columbia Analytical Services

Metals

- 3 -

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Method
			1	C	2	C	3	C	
Copper			0.39	B	0.30	U			200.8
Zinc			1.1	B	0.4	U			200.8

0029

Columbia Analytical Services

Metals

- 6 -

DUPLICATES

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Units: UG/L

Project Name: Starkist Effluent Monitoring

Basis: N/A

Matrix: WATER

% Solids: 0.0

Sample Name: DLCSW K0708475

Lab Code: LCSWD

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Copper		1.98		1.97		0.5		200.8
Zinc		2.10		2.36		11.7		200.8

Columbia Analytical Services

Metals

- 10 -

DETECTION LIMITS

Client: Glatzel da Costa, gdc

Service Request: K0708430

Project No.: SKS0702.TW

Project Name: Starkist Effluent Monitoring

ICP/ICP-MS ID #: K-ICP-MS-03

GFAA ID #:

AA ID #:

Analyte	Isotope	Back-ground	MRL ug/L	MDL ug/L	M
Copper	65		1.00	0.3	MS
Zinc	66		5.0	0.4	MS

Comments:

0033

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
Sample Matrix: Water

Service Request: K0708430
Date Collected: 09/05/07
Date Received: 09/18/07

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0708430-001	5.0	0.25	5	09/18/07	09/26/07	61.4	
SKS-2	K0708430-002	1.0	0.05	1	09/18/07	09/26/07	16.8	
SKS-3	K0708430-003	1.0	0.05	1	09/18/07	09/26/07	15.2	
SKS-4	K0708430-004	1.0	0.05	1	09/18/07	09/26/07	49.0	
SKS-5	K0708430-005	1.0	0.05	1	09/18/07	09/26/07	63.0	
SKS-6	K0708430-006	1.0	0.05	1	09/18/07	09/26/07	50.2	
SKS-7	K0708430-007	1.0	0.05	1	09/18/07	09/26/07	86.6	
SKS-8	K0708430-008	1.0	0.05	1	09/18/07	09/26/07	122	
Method Blank 1	K0708430-MB1	1.0	0.05	1	09/17/07	09/26/07	0.3	B
Method Blank 2	K0708430-MB2	1.0	0.05	1	09/17/07	09/26/07	ND	
Method Blank 3	K0708430-MB3	1.0	0.05	1	09/17/07	09/26/07	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
Sample Matrix: Water

Service Request: K0708430
Date Collected: 09/05/07
Date Received: 09/18/07
Date Extracted: 09/18/07
Date Analyzed: 09/26/07

Matrix Spike/Duplicate Matrix Spike Summary
 Total Metals

Sample Name: SKS-4 Units: ng/L
Lab Code: K0708430-004S, K0708430-004SD Basis: NA
Test Notes:

Analyte	Prep Method	Analysis Method	MRL	Percent Recovery										Result Notes
				Spike Level		Sample Result	Spike Result		CAS Acceptance Limits		Relative Percent Difference			
				MS	DMS		MS	DMS	MS	DMS				
Mercury	METHOD	1631E	1.0	25	25	49.0	67.7	71.2	75	89	71-125	5		

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
LCS Matrix: Water

Service Request: K0708430
Date Collected: NA
Date Received: NA
Date Extracted: 09/18/07
Date Analyzed: 09/26/07

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.60	92	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
LCS Matrix: Water

Service Request: K0708430
Date Collected: NA
Date Received: NA
Date Extracted: 09/18/07
Date Analyzed: 09/26/07

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.46	89	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0702.TW
LCS Matrix: Water

Service Request: K0708430
Date Collected: NA
Date Received: NA
Date Extracted: 09/18/07
Date Analyzed: 09/26/07

**Quality Control Sample (QCS) Summary
Total Metals**

Sample Name: Quality Control Sample

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.34	87	77-123	

TECHNICAL MEMORANDUM

gdc

EFFLUENT METALS TESTING – STARKIST SAMOA FEBRUARY 2007 SAMPLING

Prepared For: StarKist Samoa (NPDES Permit AS0000019)

Prepared By: Steve Costa
Karen Glatzel
gdc, P.O. Box 1238, Trinidad, CA 95570
707-677-0123 – gdcocn@earthlink.net

Date: 27 July 2007

Distribution: Carl Goldstein
United States Environmental Protection Agency, Region 9
Peter Peshut
American Samoa Environmental Protection Agency

SUMMARY

The NPDES permit for StarKist Samoa includes effluent limitations for copper and zinc. The renewal permit will also include an effluent limitation for mercury. All three metals are discharged into an approved mixing zone. Semi-annual effluent monitoring for all three metals is currently required. The analysis for the 2007 non-tradewind season was done using eight (8) samples collected every three hours on February 27th and 28th, 2007. The results are summarized as follows:

	Flow (mg/d)	Hg (µg/l)	Cu (µg/l)	Zn (µg/l)
Minimum	1.76	0.0427	1.43	142
Average	2.17	0.0635	2.05	191
Maximum	2.50	0.0825	2.98	296
Water Quality Criterion		0.0500	3.10	81.0
Required Dilution		2.2	--	3.9

Copper was below the American Samoa Water Quality Standards criterion for all samples. Mercury exceeded the ASWQS criterion for 7 of the eight samples and zinc exceeded the criterion for all eight samples. Using background concentrations based on receiving water monitoring the dilutions required to meet the ASWQS criteria were two orders of magnitude lower than the predicted critical initial dilution. Therefore, compliance with the ASWQS is demonstrated well within the zone of initial dilution and the approved mixing zones.

INTRODUCTION

In February 2007 metals analysis was conducted on effluent grab samples from the StarKist Samoa (SKS) final effluent. The samples were collected before the SKS effluent enters the Joint Cannery Outfall (JCO) shared with Chicken of the Sea Samoa Packing (COS). Both SKS and COS process tuna and the process wastewater is discharged to the outer Pago Pago Harbor through a pipeline terminating in an engineered diffuser in approximately 176 feet of water.

The existing SKS NPDES permit and renewal application has a permitted ZOM for both copper and zinc. The SKS NPDES Permit renewal application¹ indicated that mercury will require a mixing zone. Effluent grab samples were collected at the same time as the flow weighted composite sample for the semi-annual toxicity test on the combined JCO effluent discharge. The metals tested were mercury, copper, and zinc. This Technical Memorandum reports the results of the sampling and analyses.

Formerly SKS collected and analyzed effluent copper and zinc on a monthly basis and these data were reported on the SKS monthly Discharge Monitoring Report (DMR) forms. During the NPDES Permit renewal period, beginning in January 2006, the U.S. Environmental Protection Agency (USEPA) has approved semi-annual effluent testing for copper and zinc at the same time as the effluent toxicity testing in place of the monthly sampling. The results reported in this Technical Memorandum are intended to satisfy that requirement. This approach to testing the effluent is expected to carry over to the renewal NPDES Permit when it is issued.

APPROACH AND METHODS

Sampling and sample handling methods followed the standard operating procedures (SOP) that were previously developed and approved by the USEPA and ASEPA for cannery effluent sampling. Between 09:00 on 27 February and 06:00 on 28 February 2007, samples of final effluent were collected from the SKS effluent discharge at the established effluent sampling site.

A total of eight grab samples were collected into 1-gallon plastic cubitainers. Samples were collected at approximately three-hour intervals over the 24-hour period. Each cannery started the sampling at the same time to simulate the cannery effluent entering the JCO². The samples were stored on ice or in a refrigerator until the completion of the 24-hour sampling period.

After all samples were collected, laboratory supplied bottles (one for mercury analysis and one for copper and zinc analysis) were filled at the same time a flow-proportioned composite sample was prepared for the concurrent bioassay test sample. The samples were packed on ice in an ice chest for shipment to the laboratory. A chain-of-custody form for the samples was completed and sealed into a zip-lock bag and taped inside the lid of the ice chest. The samples were shipped via DHL to the testing laboratory. The chain-of-custody form and the DHL waybill are provided in Attachment I.

¹ Submitted to USEPA in July 2005.

² Results of the COS metals analyses and the JCO bioassay testing are presented in separate reports.

RESULTS AND DISCUSSION

The grab sample collection times, effluent flow rates, and results of the analyses for metals are summarized in Table 1. The laboratory data report is provided in Attachment 2.

Time	Flow (mg/d)	Hg (µg/l)	Cu (µg/l)	Zn (µg/l)
27 Feb 2007 - 09:00	2.20	0.0550	1.56	169
27 Feb 2007 - 12:00	2.02	0.0586	2.31	296
27 Feb 2007 - 15:00	2.06	0.0676	2.02	178
27 Feb 2007 - 18:00	2.50	0.0501	1.43	142
27 Feb 2007 - 21:00	2.48	0.0704	2.16	196
28 Feb 2007 - 00:00	1.76	0.0427	1.81	166
28 Feb 2007 - 03:00	2.16	0.0825	2.98	222
28 Feb 2007 - 06:00	2.15	0.0810	2.13	159
Minimum	1.76	0.0427	1.43	142
Average	2.17	0.0635	2.05	191
Maximum	2.50	0.0825	2.98	296
Standard Deviation	0.242	0.0143	0.48	48.9

The results of the metals testing for mercury indicate:

- The average mercury concentration for the SKS February 2007 samples (0.0635 µg/l; Table 1) is less than the value reported in the priority pollutant scan³ (0.27 µg/l) and less than to the averages of supplemental mercury testing conducted in previous analyses summarized in the next section.
- There was little variability among the results from individual grab samples (standard deviation = 0.014 µg/l) as shown in Table 1.
- Seven of the eight of the samples were above the recently revised ASWQS water quality standard criteria of 0.05 µg/l. The current NPDES Permit does not have a limitation for mercury.
- There appears to be no significant relationship between the flow rate and the effluent mercury concentration as shown in Figure 1.

The results of the metals testing for copper indicate:

- The average copper concentration for the SKS February 2007 samples was 2.05 µg/l (Table 1). The average concentrations reported for this sampling period are less than those reported for previous analyses as described in the next section.
- There was little variability among the copper results from the eight individual grab samples with a standard deviation of 0.48 µg/l.

³ Conducted in September 2004.

- All of the samples had copper concentrations below the ASWQS criterion⁴ of 3.1 µg/l. The values are well below the current NPDES Permit limitation for copper (monthly average of 66 µg/l, and daily maximum of 108 µg/l).
- There appears to be no significant relationship between the flow rate and the effluent copper concentrations as shown in Figure 2.

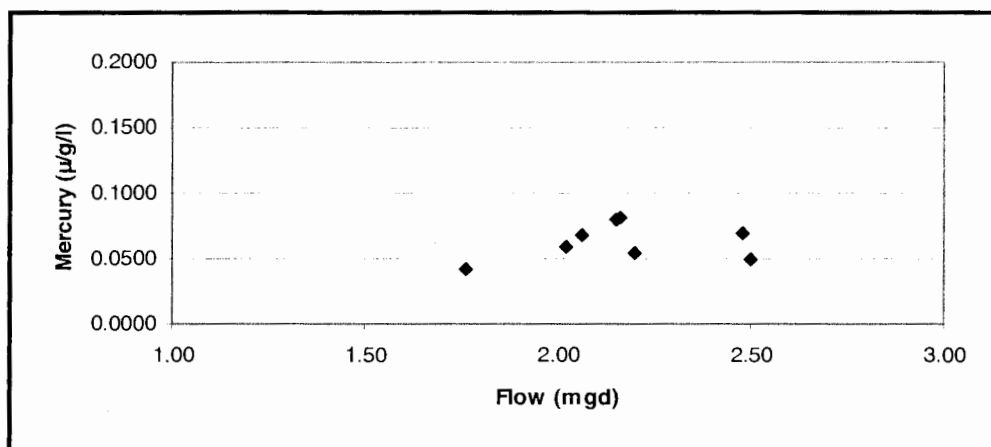


Figure 1. SKS effluent flow rate and mercury concentration (Feb 2007)

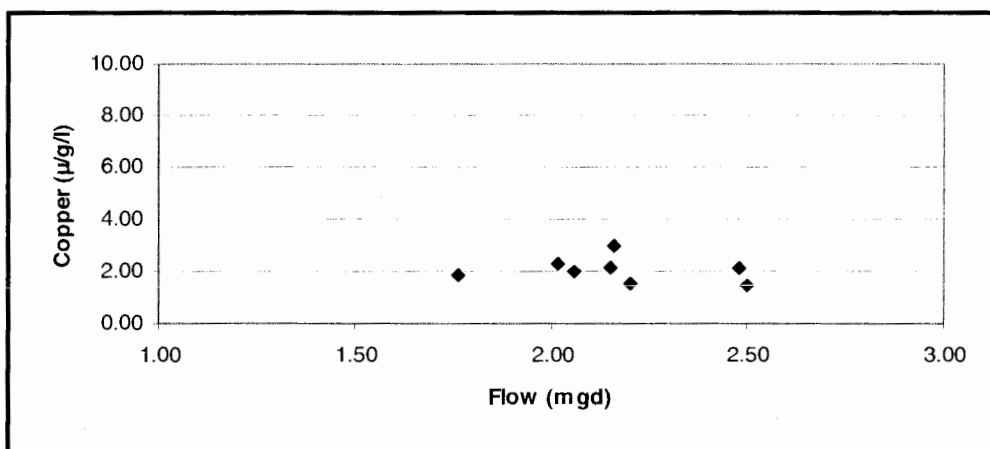


Figure 2. SKS effluent flow rate and copper concentration (Feb 2007)

The results of the sample testing for zinc indicate:

- The average zinc concentration for the SKS February 2007 samples was 191 µg/l (Table 1). This concentration is less than the average values for previous analyses described in the next section.

⁴ The ASWQS criterion for copper is based on the USEPA National Recommended Water Quality Criteria, by reference.

- There was noticeable but relatively small variability among the zinc results from individual grab samples (standard deviation = 48.9) with a range between 142 µg/l and 296 µg/l (Table1).
- All eight zinc samples were above the ASWQS criteria⁵ of 81 µg/l. All values are well below the current NPDES Permit limitation (1545 µg/l monthly average and 1770 µg/l daily maximum).
- There appears to be no significant relationship between the flow rate and the effluent zinc concentration as shown in Figure 3.

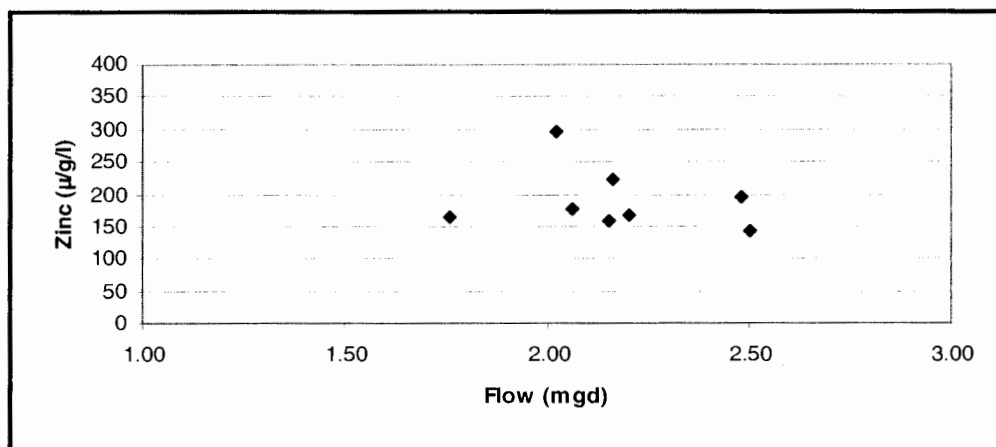


Figure 3. SKS effluent flow rate and zinc concentration (Feb 2007)

Comparison to Previous Tests

A summary of the semi annual metals testing is presented in Table 2. Each of the metals under consideration has been measured in the effluent above the ASWQS criteria. Table 2 also provides the results of calculations necessary to show that ASWQS will be achieved within the zone of initial dilution. The required dilution is calculated using the following equation:

$$D_R = \frac{C_E - C_A}{C_S - C_A}$$

where

D_R = is the dilution required to reduce the concentration to the ASWQS

C_E = the effluent concentration

C_A = the maximum receiving water concentration

C_S = The ASWQS criterion

⁵ The ASWQS criterion for zinc is based on the USEPA National Recommended Water Quality Criteria, by reference.

Table 2. Summary of Effluent Metals Testing Results and Dilution Required to Meet ASWQS Criteria							
Parameter		Mercury		Copper		Zinc	
Water Quality Criterion		0.05 µg/l		3.1 µg/l		81 µg/l	
Ambient Maximum		0.0232 µg/l		0.83 µg/l		0.55 µg/l	
Sample Date	Flow (mgd)	Conc. (µg/l)	Dilution Required	Conc. (µg/l)	Dilution Required	Conc. (µg/l)	Dilution Required
Aug 2005	2.44	0.0734	1.87				
	3.05	0.109	3.20				
	3.02	0.101	2.90				
	2.39	0.122	3.69				
	2.55	0.177	5.74				
	2.8	0.153	4.84				
	2.03	0.112	3.31				
	2.14	0.0912	2.54				
Feb 2006	1.98	0.107	3.13	3.63	1.23	264	3.27
	2.63	0.083	2.23	2.82		196	2.43
	2.6	0.298	10.25	2.17		146	1.81
	1.94	0.088	2.42	3.61	1.22	226	2.80
	1.95	0.096	2.72	3.67	1.25	340	4.22
	2.16	0.092	2.57	2.44		267	3.31
	2.53	0.102	2.94	1.79		190	2.35
	2.15	0.145	4.54	4.83	1.76	266	3.30
Nov 2006	2.03	0.0802	2.13	2.92		200	2.48
	2.12	0.0820	2.19	3.93	1.37	272	3.37
	2.22	0.150	4.73	4.32	1.54	368	4.57
	2.76	0.140	4.36	3.3	1.09	322	4.00
	2.59	0.106	3.09	3.14	1.02	329	4.08
	2.40	0.104	3.01	2.79		246	3.05
	2.41	0.158	5.03	3.35	1.11	278	3.45
	2.60	0.115	3.43	2.28		195	2.42
Feb 2007	2.20	0.0550	1.19	1.56		169	2.09
	2.02	0.0586	1.32	2.31		296	3.67
	2.06	0.0676	1.66	2.02		178	2.21
	2.50	0.0501	1.00	1.43		142	1.76
	2.48	0.0704	1.76	2.16		196	2.43
	1.76	0.0427		1.81		166	2.06
	2.16	0.0825	2.21	2.98		222	2.75
	2.15	0.0810	2.16	2.13		159	1.97
Minimum	1.76	0.04	1.00	1.43	1.02	142.00	1.76
Average	2.34	0.11	3.17	2.81	1.29	234.71	2.91
Maximum	3.05	0.30	10.25	4.83	1.76	368.00	4.57

Conclusions

Based on the available data a mixing zone will be required for each of the three metals considered. The required dilution (See Table 2) for all of the metals is substantially less than the critical initial dilution, which is over 300:1⁶. Therefore, compliance with the ASWQS criteria will be achieved well within the ZID. The highest dilution required was 10.3:1, which will be achieved within 2.7 meters of the discharge point, within three seconds after discharge, and about one meter above the discharge point (in a total water depth of about 53.6 meters).

⁶ See "Request for Water Quality Certification and the Definition of Mixing Zones". **gdc**, 28 June 2007

ATTACHMENT I

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☐ Yes Declared Value for Carriage (in US \$) _____
Not all payment options are available in all countries.
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2 From (Shipper)

Shipper's Account Number 918902 636 Contact Name JOE CARNEY
Shipper's Reference (up to 35 characters) NPDES-RW-GAC
Company Name STAR KIST SAMOA
Address
P.O. Box
AMERICAN SAMOA

Post/ZIP Code (required) 96799 Phone, Fax, or E-mail (required) 684644 4231

3 To (Receiver)

Company Name COLUMBIA ANALYTICAL SERVICES
Contact Person HARVEY JACKY
Delivery Address DHL Cannot Deliver to a PO Box
1317 SOUTH 13TH AVE
KELSO WA
Country USA

Post/ZIP Code (required) 98626 Phone, Fax, or E-mail (required) 360-577-7222



6003355813

4 Shipment Details

Total number of packages 6 Total Weight 313 lbs
If DHL Express Document packaging used, enter XD.
Dimensions (in inches)
Pieces Length Width Height
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@ x x
@ x x

5 Full Description of Contents

Give Content and Quantity
WATER QUALITY SAMPLES
FOR LABORATORY ANALYSIS
NO COMMERCIAL VALUE

6 Dutiable Shipments Only (Customs requirement)

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Export License No./Symbol (if applicable) Receiver's VAT/GST or Shipper's EIN/SSN
Declared Value for Customs (in US \$) (as on commercial/proforma invoice) 300
Schedule B Number / Harmonized Code (if applicable)
AES TRANSACTION NUMBER TYPE OF EXPORT
☐ Permanent ☐ Repair/Return ☐ Temporary
Destination Duties/Taxes If left blank, Receiver pays duties/taxes.
☐ Receiver ☒ Shipper ☐ Other
The commodities, technology or software to be exported from the U.S. are in compliance with the U.S. Bureau of Export Administration. Diversion to countries contrary to U.S. law prohibited.

7 Shipper's Authorization (signature required)

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DHL EXPRESS (USA), INC.

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AB0015 EC (11/05)

CHAIN OF CUSTODY

PROJECT:	StarKist Effluent Monitoring - SKS0701.NT													
FROM:	Karen Glatzel, gdc													
	P.O. Box 1238, Trinidad, CA, 95570-1238						707-677-0123			gdcocn@earthlink.net				
TO:	Harvey Jacky, Columbia Analytical Services													
	1317 South 13th Ave, Kelso, WA 98626						360-577-7222							
SAMPLE I.D.	DATE	TIME	MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUESTED								COMMENTS	
					Total-P	NH3-N	NO3+NO2	TKN (AmTest)	Chlorophyll-a	Cu	Zn	Hg		
SKS-1	2/28/2007		Water	2							X	X	X	Total metals
SKS-2	2/28/2007		Water	2							X	X	X	
SKS-3	2/28/2007		Water	2							X	X	X	
SKS-4	2/28/2007		Water	2							X	X	X	
SKS-5	2/28/2007		Water	2							X	X	X	
SKS-6	2/28/2007		Water	2							X	X	X	
SKS-7	2/28/2007		Water	2							X	X	X	
SKS-8	2/28/2007		Water	2							X	X	X	
SAMPLED BY: K. Glatzel <i>KAG</i>				DATE/TIME:	2/28/2007		SPECIAL INSTRUCTIONS/REMARKS: Note: Sample may be as much as 40% seawater Report Dup, MS, MSD as required							
SHIPPED VIA: DHL				DATE/TIME:	3/1/2007									
RELINQUISHED BY: S.Costa <i>SC</i>				DATE/TIME:	3/1/2007									
RECEIVED BY:				DATE/TIME:										
RELINQUISHED BY:				DATE/TIME:										
RECEIVED BY:				DATE/TIME:										

ATTACHMENT II

Columbia Analytical Systems Laboratory Report

COLUMBIA ANALYTICAL SERVICES, INC.

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
Sample Matrix: Water

Service Request No.: K0701734
Date Received: 3/5/07

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 3/5/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

General Comments:

Insufficient sample was available to prepare matrix spike and duplicate samples for the reductive precipitation procedure. The Laboratory Control Sample (LCS) was prepared and analyzed in duplicate.

Approved by _____ Date 3/20/07

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- B The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL has been elevated due to a matrix interference.
- X See case narrative.
- * The duplicate analysis not within control limits. See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
- U The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
- i The MRL/MDL has been elevated due to a chromatographic interference.
- X See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
Sample Matrix: Water

Service Request: K0701734
Date Collected: 2/28/07
Date Received: 3/5/07

Mercury, Total

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
SKS-1	K0701734-001	1.0	0.05	1	3/5/07	3/12/07	55.0	
SKS-2	K0701734-002	1.0	0.05	1	3/5/07	3/12/07	58.6	
SKS-3	K0701734-003	1.0	0.05	1	3/5/07	3/12/07	67.6	
SKS-4	K0701734-004	1.0	0.05	1	3/5/07	3/12/07	50.1	
SKS-5	K0701734-005	1.0	0.05	1	3/5/07	3/12/07	70.4	
SKS-6	K0701734-006	1.0	0.05	1	3/5/07	3/12/07	42.7	
SKS-7	K0701734-007	1.0	0.05	1	3/5/07	3/12/07	82.5	
SKS-8	K0701734-008	1.0	0.05	1	3/5/07	3/12/07	81.0	
Method Blank	K0701734-MB1	1.0	0.05	1	3/5/07	3/12/07	0.2	B
Method Blank	K0701734-MB2	1.0	0.05	1	3/5/07	3/12/07	0.07	B
Method Blank	K0701734-MB3	1.0	0.05	1	3/5/07	3/12/07	0.1	B

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
Sample Matrix: Water

Service Request: K0701734
Date Collected: 2/28/07
Date Received: 3/5/07
Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Matrix Spike/Duplicate Matrix Spike Summary
 Total Metals

Sample Name: SKS-1
Lab Code: K0701734-001MS, K0701734-001MSD
Test Notes:

Units: ng/L
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level		Sample Result	Spike Result		Percent Recovery		CAS Acceptance Limits	Relative Percent Difference	Result Notes
				MS	DMS		MS	DMS	MS	DMS			
Mercury	METHOD	1631E	1.0	25	25	55.0	81.8	83.3	107	113	71-125	2	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
LCS Matrix: Water

Service Request: K0701734
Date Collected: NA
Date Received: NA
Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.44	109	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
LCS Matrix: Water

Service Request: K0701734
Date Collected: NA
Date Received: NA
Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.45	109	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Glatzel da Costa, gdc
Project: Starkist Effluent Monitoring/SKS0701.NT
LCS Matrix: Water

Service Request: K0701734
Date Collected: NA
Date Received: NA
Date Extracted: 3/5/07
Date Analyzed: 3/12/07

Quality Control Sample (QCS) Summary
Total Metals

Sample Name: Quality Control Sample

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.32	106	77-123	

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-1

Lab Code: K0701734-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	1.56		
Zinc	200.8	1.04	0.10	1	3/13/07	3/15/07	169		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µg/L

Basis: NA

Sample Name: SKS-2

Lab Code: K0701734-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.02	1	3/13/07	3/15/07	2.31		
Zinc	200.8	10.80	1.08	10	3/13/07	3/15/07	296		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-3

Lab Code: K0701734-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.02		
Zinc	200.8	1.06	0.11	1	3/13/07	3/15/07	178		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-4

Lab Code: K0701734-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.22	0.02	1	3/13/07	3/15/07	1.43		
Zinc	200.8	1.08	0.11	1	3/13/07	3/15/07	142		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-5

Lab Code: K0701734-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.02	1	3/13/07	3/15/07	2.16		
Zinc	200.8	10.20	1.02	10	3/13/07	3/15/07	196		

% Solids: 0.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-6

Lab Code: K0701734-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.20	0.02	1	3/13/07	3/15/07	1.81		
Zinc	200.8	1.02	0.10	1	3/13/07	3/15/07	166		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-7

Lab Code: K0701734-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.98		
Zinc	200.8	10.50	1.05	10	3/13/07	3/15/07	222		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected: 02/28/07

Project Name: Starkist Effluent Monitoring

Date Received: 03/05/07

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: SKS-8

Lab Code: K0701734-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.21	0.02	1	3/13/07	3/15/07	2.13		
Zinc	200.8	1.06	0.11	1	3/13/07	3/15/07	159		

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Date Collected:

Project Name: Starkist Effluent Monitoring

Date Received:

Matrix: WATER

Units: µG/L

Basis: NA

Sample Name: Method Blank

Lab Code: K0701734-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Copper	200.8	0.10	0.01	1	3/13/07	3/15/07	0.01	U	
Zinc	200.8	0.50	0.05	1	3/13/07	3/15/07	0.05	U	

% Solids: 0.0

Comments:

Columbia Analytical Services

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper	12.5	12.7	102	25.0	25.5	102	23.3	93	200.8
Zinc	25.0	25.8	103	25.0	25.5	102	23.3	93	200.8

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	24.2	97	24.9	100	200.8
Zinc				25.0	24.6	98	25.0	100	200.8

Columbia Analytical Services

METALS

- 2a -

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Copper				25.0	25.1	100			200.8
Zinc				25.0	25.5	102			200.8

Columbia Analytical Services

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	Initial	Final			
				True	Found	%R	Found	%R
Copper				1.0	1.08	108		
Zinc				5.0	5.05	101		

Columbia Analytical Services

METALS

- 3 -

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		Method
	C		1	C	2	C	3	C	C		
Copper	0.10	U	0.10	U	0.10	U	0.10	U			200.8
Zinc	0.50	U	0.50	U	0.50	U	0.50	U			200.8

Columbia Analytical Services

METALS

-3-

BLANKS

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		Method
	C		1	C	2	C	3	C	C		
Copper			0.10	U	0.10	U					200.8
Zinc			0.50	U	0.50	U					200.8

Columbia Analytical Services

METALS

- 7 -

LABORATORY CONTROL SAMPLE

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

Analyte	Aqueous ug/L			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits	%R	
Copper	2.00	1.98	99						
Zinc	2.00	2.02	101						

Columbia Analytical Services

METALS

-7-

LABORATORY CONTROL SAMPLE

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source:

Analyte	Aqueous ug/L			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits	%R	
Copper	2.00	1.94	97						
Zinc	2.00	1.95	98						

Columbia Analytical Services

METALS

-10-

METHOD DETECTION LIMITS

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICP/ICP-MS ID #: Excell ICPMS

GFAA ID #:

AA ID #:

Analyte	Mass	Back-ground	MRL (ug/L)	MDL (ug/L)	Method
Copper	65		1.00	0.10	200.8
Zinc	66		5.00	0.50	200.8

Comments:

METALS

-12-

ICP LINEAR RANGES (QUARTERLY)

Client: Glatzel da Costa, gdc

Service Request: K0701734

Project No.: SKS0701.NT

Project Name: Starkist Effluent Monitoring

ICP ID Number: Excell ICPMS

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Copper	15.00	1000.0	200.8
Zinc	15.00	1000.0	200.8

Comments: _____
